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An investigation into the growth of
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AN INVESTIGATION INTO THE GROWTH OF LANGUAGE
CONCEPTS IN HISTORY OF BELLEVUE INTERMEDIATE
AND HIGH SCHOOL STUDENTS.

A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF ARTS

DEPARTMENT OF EDUCATION

BY
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BELLEVUE, ALBERTA.

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INTRODUCTION

This investigation was suggested by Dr. H. E. Smith as an investigation co-ordinate with that previously proposed for Mr. J.H. McLean. The general purpose and scope of the investigation as suggested was to estimate, from grades VI to XII, the increasing richness of children's language concepts, choosing for this purpose a list of key words from any school subject in which I was interested. Having taught History for several years, and because History is a subject of continuous instruction from grade six to grade twelve, I chose the key words from that subject.

The investigation was carried on in the Bellevue Public and High Schools, in constant collaboration with that undertaken by Mr. McLean. I have been helped very much by his advice and assistance. I am permitted to use the data and results which he obtained in order to make comparisons with mine. Dr. M.E. Lazerte and Dr. H.E. Smith have assisted greatly, especially by their advice, and also by giving one of the tests to a University class for the purpose of comparing results, and more especially to find out what scores educated, mature persons would make on these tests. Many of the tabulations were checked by Miss E. Chiaravano.

In order that this report and that by Mr. McLean should be easily comparable, the two are arranged in parallel form. The fact that our aims, methods, and general conclusions are similar leads to a general similarity in the two reports.

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CHAPTER I

THE PROBLEM

The problem was to estimate, as objectively as possible, the increasing richness of language concepts in History from grades six to twelve. Though indirectly the extent of vocabulary and the ability to read and answer questions might also be measured, the essential aim was to determine as comprehensively as possible denotation, connotations, shades of meaning and range of significance with reference to the students' knowledge of the selected key words.

This problem is intimately connected with the ability of school children to read and to understand and their ability to carry on independent study. The investigation may suggest that many students fail to understand what they read and hear because they do not know, as fully and as accurately as they should, what words mean.

CHAPTER II

THE APPROACH TO THE PROBLEM

Methods

The means available for collecting the data were three: oral tests, written tests, or both. Considerable preliminary testing, exploratory in nature, was done in order to determine the method to use. At first, a number of students were questioned orally. There are a number of arguments in favor of this method. The student is not hampered in his responses by any set system of questioning, but may talk freely, telling all that he knows about the word as his mental associations may prompt him. The responses may be tested immediately to determine if they are based on exact knowledge, how far that knowledge goes, and his degree of certainty, which may range from pure guessing to conviction.

Yet this preliminary oral testing revealed certain weaknesses in this method, from the point of view of the purpose in view. On their own initiative, students were able to express only meagre

knowledge of the test words. In order to secure from the students the information wanted, it was necessary to question them. If oral questioning were used, in order that there should be any basis of comparison between students, a standard form of questioning would need to be followed; in that case, the oral method comes to resemble closely the written questionnaire method. Unless there were a uniform procedure, the scoring would vary for each student. The scoring of oral responses had to be done quickly, without much time for reflection by the investigator; hence the scoring would tend to lack objectivity. Several students, even some grade twelve boys, appeared shy and handicapped by self--consciousness during oral questioning.

On the other hand, there appear to be several advantages of the written questionnaire. It brings out the students' knowledge more fully, provided that the test is comprehensive enough and that the questioning is apt. Students have the advantage of having answered many written tests in their ordinary school work. It makes possible the testing of more students in less time. All students are tested at the same time, hence there is little chance of any student making preliminary preparation for the test. Such a test is uniform in content and in manner of administration for all students. There is a greater possibility of uniformity and objectivity in scoring. The students are more at their ease as members of their usual groups, and thus are more likely to do their best. The students had time to think more carefully before answering. A written test provides a permanent record of questions and responses which permit later analyses and interpretation.

Two disadvantages of the written method appeared. It was impossible to determine accurately the degree of conviction possessed by the students in respect to many of the responses. Also, certain questions suggested the answers to other questions. Often, students gave as an original sentence one very similar to a later one dealing with the correct recognition, and sometimes they gave as definitions words selected from the list of synonyms. This

difficulty could have been avoided, to a great extent, by dividing the test on each word into two separate parts, the first part asking only for the use of the word in an original sentence and for the definition of the word.

I chose the written questionnaire method as being, on the whole, the better for the collection of the data. I think that better results might have been obtained if at least some of the students had been questioned orally in regard to their previously written tests. Though this was done in many cases, no record was kept, apart from suggestions for improving the later tests.

CONSTRUCTION OF THE TESTS

As the final form of the tests took shape, certain principles were adopted in respect to their construction. Primarily, each test should be adapted to each word rather than that the words should be tested in any constant standardized form. Different words are best tested in different ways; for example, some words have many synonyms, others have few. There were only two questions used in every test, those asking the student to use the word correctly, and to define the word. In all other cases, the type of question employed varied with the word being tested. In the second place, each test should deal with as many meanings and be as comprehensive as possible. Thirdly, knowledge and error should be measured separately. Finally, the tests should be as objective as possible.

Based on these principles, several different types of questions were given. In addition to those asking the student to use the word in a sentence and to define the word, other types were more or less frequent. They include recognition of correct usage, selection of synonyms, knowledge of grammatical forms of the words, judgement as to whether a word is appropriate in given situations, and other less frequent types. In the earlier tests the student was asked to tell about any difficulty he had in answering any question, the purpose being to find out if any

ambiguity or unforeseen response was influencing the answer.

Also, in the earlier tests, the students were asked to tell anything else that he knew about the word. Both types were later omitted as being of very little value.

All the tests were constructed in collaboration with Mr. J.H. McLean. His criticism helped greatly in contributing to whatever degree of comprehensiveness and objectivity the tests may possess.

The tests follow in the order in which they were given.

Word Meaning Test #1

November 15, 1935.

Name _____ GRADE _____ Born: Year _____ Mo. _____ Day _____ No. _____

The test word is PEASANT.

1. Do you think you know the exact meaning of this word?
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. Mark each of the following as true or false:
 - (a) ☐ A peasant pays low wages to his employees.
 - (b) ☐ A peasant is an uneducated farmer.
 - (c) ☐ A peasant works on the land.
 - (d) ☐ A peasant can afford expensive amusements.
 - (e) ☐ A peasant generally has the right to vote.
 - (f) ☐ Peasants have sometimes revolted.
 - (g) ☐ Peasants live in cities or towns.
 - (h) ☐ A peasant is subject to his master.
 - (i) ☐ There are many peasants in democracies.
5. To what part of speech does the word belong?
6. In what school subject is the word often used?
7. Underline in the following list the tools which a peasant would frequently use in his work: hoe, rake, camera, tractor, typewriter, shovel, pick, blowtorch, scissors, axe.
8. Is the word correctly used in each of the following sentences?
 - (a) ☐ Can you peasant this story?
 - (b) ☐ She admitted that she was a peasant.
 - (c) ☐ The peasant dined with his family.
 - (d) ☐ To-day is the peasant time.
9.
 - (a) Is a peasant more like a landlord, renter, or serf?
 - (b) Is a peasant more like a farmer, artisan, or slave?
 - (c) Is a peasant more like a laborer, employer, or employee?
 - (d) Is a peasant more like a villein, hired man, or miner?
10. Write a paragraph telling anything else that you know about a peasant.

Word Meaning Test #2

November 22.

Name _____ Grade _____ Born: Year _____ Mo. _____ Day _____ No. _____

Test Word is FEUDALISM.

1. Do you know the exact meaning of this word? Yes -- no.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. Mark each of the following as true or false:
 - (a) _____ All traces of feudalism have passed away.
 - (b) _____ Henry VIII introduced feudalism into England.
 - (c) _____ Feudalism originated in Western Europe.
 - (d) _____ Feudalism exists now in Alberta.
 - (e) _____ The invention of gunpowder helped to destroy feudalism.
 - (f) _____ Feudalism flourished from the tenth to the thirteenth centuries.
 - (g) _____ The real power was in the hands of the great lords, not the king.
 - (h) _____ The lord ruled his tenants as if he were their king.
 - (i) _____ A fief was the land received by a vassal.
 - (j) _____ A vassal owed certain duties to his lord.
5. To what part of speech does the word belong?
Give the adjective form of the word.
6. Underline in the following list the classes of people who were a part of the feudal system: consul, lord, pirate, tenant, rajah, vassal, banker, sailor, knight.
7. Is the word correctly used in each of the following sentences?
 - (a) King John lived during the time of feudalism.
 - (b) The student can feudal his parents.
 - (c) Can you feudalism this problem?
 - (d) The feudal barons lived in castles.
8. Fill in each blank with the word which will make each sentence true.
Under the feudal system,
 - (a) The _____ owned all the land in theory.
 - (b) In reality the _____ owned his own land.
 - (c) Surplus land was parcelled out to _____.
 - (d) A person who received a parcel of land promised to be _____ to his _____, and agreed to work for him a certain number of days on his _____.
 - (e) The former holders of the land gave it to _____ in return for protection of life and property.
9. Explain briefly any difficulty you had in answering any questions.
10. Tell anything else you know about the word feudalism.

WORD MEANING TEST # 3.

November 29.

Name _____ Grade _____ Born: Year _____ Month _____ Day _____ No. _____

The test word is LAW.

1. Do you know the exact meaning of this word? Yes----no.
2. Use the word in a sentence which shows its meaning.
3. Define the word as completely as you can.
4. Mark each of the following as true or false:
 - (a) _____ That the earth attracts all bodies on its surface is a law.
 - (b) _____ The Government enforces the laws.
 - (c) _____ A scientific law may indicate the relation between events.
 - (d) _____ Laws are made by lawyers.
 - (e) _____ A law may be unjust.
 - (f) _____ The laws tell us what is legal.
 - (g) _____ All civilized nations have laws.
5. Law is most like a precept, judge, scrivener, oath.
 Law is most like a unique, opulence, orb, ordinance.
 Law is most like a lathe, lax, maxim, testament.
 Law is most like a conference, emery, decree, bane.
 Law is most like a chicane, deprave, adage, edict.
 Law is most like a custom, foison, collusion, surge.
6. Is the word correctly used, according to its meaning, in each of the following sentences? Answer Yes, or no, after each.
 - (a) The King passed a law for his people. _____
 - (b) The student passed a law examination. _____
 - (c) Some people study law. _____
 - (d) The law states that two and two makes four. _____
 - (e) Somebody discovered the law of gravitation. _____
 - (f) The man is going to law about it. _____
7. Underline in the following list the words which might be used to complete the sentence correctly:
 "A law may be _____."
 national, language, household, universal, old, about conduct, Roman, repealed, homework, sad, obeyed, vermeil.
8. Fill in each blank with the most suitable word from the following: LAWFUL, LEGAL, LEGITIMATE, LAWLESS, RULE, CUSTOM, LAW, COMMAND.
 - (a) It is the business of the lawyer to define what is _____.
 - (b) A _____ is backed by powerful authority.
 - (c) People who disobey the laws are _____ people.
 - (d) Do you know the _____ for the use of quotation marks?
 - (e) Many men observe the _____ of shaving.
 - (f) The general was given the _____ of the battalion.
9. Tell something about a law in Alberta.
10. Explain briefly any difficulty you had in answering the question.
11. Tell anything else that you know about the word LAW.

Word Meaning Test #4

December 6.

Test Word is FREE.

1. Do you think you know the meaning of this word? Yes--no.
2. Use the word in a sentence which shows its meaning.
3. Define the word as completely as you can.
4. Free is most like savage, independent, uneasy, fresh.
 Free is most like unlikely, confer, unhurt, unrestricted.
 Free is most like expert, explicit, exempt, express.
 Free is most like disengaged, disreputable, disrespect, distrust.
 Free is most like release, reveal, reticulate, repent.
 Free is most like dissent, annoy, deliver, dissuade.
 Free is most like literate, liberate, libidinous, licit.
 Free is most like grate, gracious, gratify, gratuitous.
 Free is most like voluntary, voluptuous, solitary, antiquary.
 Free is most like unctuous, uxorious, urban, unimpeded.
5. Is the word correctly used, according to its meaning, in each of the following sentences?
 - (a) _____ He freed himself of doubts.
 - (b) _____ The price of the book was free.
 - (c) _____ "Free the prisoners from their chains," ordered the king.
 - (d) _____ The government freed him from serving in the army.
 - (e) _____ A fool may be free with his money.
6. Explain each:
 - (a) free coinage----
 - (b) free lance-----
 - (c) free oxygen-----
 - (d) a free port-----
 - (e) free silver-----
 - (f) free thought-----
 - (g) free trade-----
 - (h) free verse-----
 - (i) a free translation---
 - (j) a free country--
7. Fill in each blank with the most suitable word from the following list: freedom, liberty, frankness, unreserved, facility, license, candid, liberal, familiar, emancipation, ingenuousness.
 - (a) The plainness of his speech confirmed the _____ of his manner.
 - (b) _____ is present in noble spirits, most frequently in the unsophisticated period of youth.
 - (c) Knowing his subject well he could speak of it with _____.
 - (d) Though he knew that he might suffer for it, he gave _____ replies to all the questions.
 - (e) Canadians enjoy the _____ accorded every British subject.
 - (f) The _____ of a city is sometimes granted to distinguished visitors.
 - (g) Abraham Lincoln was responsible for the _____ of the negroes.
8. Explain briefly any difficulty you had in answering any questions.
9. Tell anything else you know about the word FREE.

WORD MEANING TEST #5.

December 13.

Name _____ Grade _____ Born: Year _____ Month _____ Day _____ No. _____

Test word is STATE.

1. Do you think you know the meaning of this word? Yes--no.

2. Use the word correctly in a sentence.

3. Define the word as completely as you can.

4. Explain the following:

- (a) statecraft----
- (b) statehood-----
- (c) stateroom-----
- (d) statesmanship-
- (e) state--paper--
- (f) city--state---

5. Is the word correctly used, according to its meaning, in each of the following sentences? Answer yes or no.

- (a) _____ He stated the events of the story.
- (b) _____ The king rode in state.
- (c) _____ What is the state of his health?
- (d) _____ Parliament deals with state affairs.
- (e) _____ He lived in a state of luxury.
- (f) _____ He arrived at a stated time.

6. Write as many other forms of the word as you know and use each form correctly in a sentence.

- (a) Form of word- _____ Used correctly---
- (b) form of word- _____ Used correctly---
- (c) Form of word- _____ Used correctly---

7. State is most like condition, health, illness, employment.
 State is most like country, people, realm, region.
 State is most like status, stature, statute, statue.
 State is most like law, locality, government, order.
 State is most like pompous, august, dignified, majestic.
 Stately is most like magnificent, gorgeous, elegant, grand.
 Stately is most like superb, showy, dignified, celebrated.
 Statement is most like recital, story, receipt, evidence.
 Statesman is most like citizen, ruler, soldier, judge.

8. Mark each of the following as true or false:

- (a) _____ There are states in England.
- (b) _____ A state refers to a political body.
- (c) _____ States may be joined by federation.
- (d) _____ States are always republican.

9. Underline the name of any important statesman in the following list: George Stevenson, Addis Ababa, Stanley Baldwin, Eddie Cantor, Franklin Roosevelt.

10. Underline the name of any political state in the following: Asia, Japan, Bellevue, Alberta, Canada, California, South America.

11. Explain briefly any difficulty you had in answering any question.

12. Tell anything else you know about the word state.

Word Meaning Test #6

January 10, 1936.

Name _____ Grade _____ Born: Year _____ Mo. _____ Day _____ No. _____

Test Word is CIVILIZATION.

1. Do you think you know the meaning of this word? Yes--No.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. Which of the following are highly civilized countries?
Borneo, India, France, Japan, Ethiopia, China, Italy, Spain, Tibet, United States, Greenland.
5. Civilization is most like tillage, farming, cultivation, husbandry.
Civilization is most like knowledge, culture, education, power.
Civilization is most like refinement, polish, nation, government.
Civilization is most like state of citizenship, a kind of government, a state of being civilized, a belief in one God.
Civilize is most like to make a citizen, to reclaim from barbarism, to make people polite, to make people good neighbors.
6. Explain:
 - (a) Roman civilization-----
 - (b) Western civilization----
 - (c) Oriental civilization---
7. Mark each of the following as true or false:
 - (a) ___ The introduction of Christianity has helped to civilize savages.
 - (b) ___ If all nations were completely civilized they would be alike in all respects.
 - (c) ___ Christianity is an essential quality of civilization.
 - (d) ___ Civilized peoples may have cruel customs.
 - (e) ___ People who can read are always civilized.
 - (f) ___ The same nation may have different forms of civilization at different times.
 - (h) ___ All civilizations have a democratic form of government.
8. The degree of civilization possessed by a people is indicated by or measurable by size of army, number of colonies, marriage laws, education, manufactures, climate, scientific knowledge, number of inhabitants, architecture, political conditions, system of law, distance from markets, racial origin, administration of justice, literary works, reliance on tradition.
9. People have no railroads, telephones, battleships. Could they be called civilized?

People have no system of education, art, drama. Could they be called civilized?

People have no fur coats, aeroplanes, paved roads. Could they be called civilized?
10. Tell anything else you know about the word CIVILIZATION.

Word Meaning Test #7

January 17, 1936.

Name _____ Grade _____ Born: Year _____ Mo. _____ Day _____ No. _____

Test Word is DEMOCRACY.

1. Do you think you know the meaning of this word? Yes--no.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. Explain what is meant by:
 - (a) Democracy in industry---
 - (b) Democracy in politics---
5. Which of the following states have a democratic form of govt.? Canada, Italy, England, Germany, France, Belgium, Ethiopia, United States, Manchukuo.
6. Underline the names of the persons in the following list who have aided or advocated democracy: George Washington, William Lyon Mackenzie, George the Third, Napoleon, John Wesley, Sir John Eliot, Pym, Machiavelli, Anthony Adverse, Mirabeau.
7. Underline the acts of parliament or documents which have contributed to the progress of democracy: Quebec Act, Magna Carta, Licinian Laws, Volstead Act, Navigation Acts, Clarendon Code, Berlin Decree, Bill of Rights, Wilson's Fourteen Points.
8. Which of the following is the opposite of democracy? aristocracy, monarchy, despotism, technocracy.
9. Which of the following are democratic in spirit? trial by jury, customs duties, public ownership of utilities, universal franchise, public holidays, taxation, liberal education, police force, standing armies, elections, freedom of the press.
10. Which of the following are essential to a democratic form of government? king, members of parliament, civil service, governor-general, school inspectors, voters, judges, civil law, general elections, citizens, telephones.
11. Democracy is most like government by the people, government by groups, government by the bourgeoisie, government by taxpayers.
12. Mark each of the following as true or false:
 - (a) _____ Democracies always permit freedom of speech.
 - (b) _____ Democracies are always republican.
 - (c) _____ A democracy must have political parties.
 - (d) _____ A city may have a democratic form of government.
 - (e) _____ The referendum is necessary in democracies.
 - (f) _____ Democracies never make a war.
 - (g) _____ Since the Great War democracy has increased in Europe.
 - (h) _____ In a democracy every inhabitant is a citizen.
 - (i) _____ In a democracy everyone may do as he likes.
 - (j) _____ A democracy has a constitutional form of government.
 - (k) _____ Responsible government is democratic.
13. Tell anything else you know about the word democracy.

Word Meaning Test #8

January 24.

Name _____ Grade _____ Born: Year _____ Mo. _____ Day _____ No. _____

Test Word is ALLIANCE.

1. Do you think you know the meaning of this word? Yes--no.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. Which of the following are alliances? Write yes or no.
 - (a) _____ A man and his dog go out hunting together.
 - (b) _____ Two nations are at war with each other.
 - (c) _____ Two horses are pulling a load of hay.
 - (d) _____ A man marries a woman.
 - (e) _____ Nine Canadian provinces joined to form the Dominion of Canada.
 - (f) _____ Two subjects are on the time table at the same hour.
 - (g) _____ Canada and the U.S.A. have made a trade agreement.
 - (h) _____ Two nations have signed a peace treaty.
 - (i) _____ Two thieves join together to rob a house.
 - (j) _____ Two nations agree to defend each other in case of attack.
5. Mark each of the following as true or false:
 - (a) _____ Two states which are allied may be called an alliance.
 - (b) _____ If two states enter into an alliance they will have only one government.
 - (c) _____ An alliance might have a president and secretary.
 - (d) _____ Alliances occur only between nations.
 - (e) _____ A labor union is one form of alliance.
 - (f) _____ Some alliances are temporary.
 - (g) _____ Hydrogen is allied with oxygen to form water.
 - (h) _____ An alliance may be a union artificially formed between persons.
 - (i) _____ There may be a matrimonial alliance between families.
6. (a) In what sense is religion allied to morality?
 (b) In what sense may the church be allied to the state?
 (c) In what sense is history allied to geography?
 (d) In what sense is the League of Nations an alliance?
7. Underline only one word in each sentence.
 - (a) Alliance is most like affinity, able, ally, fusion.
 - (b) Alliance is most like group, league, bond, covenant.
 - (c) Ally is most like associate, partner, friend, brother.
 - (d) To ally is most like to help, to form, to obligate, to bind.
8. Is the underlined word correctly used in each of the following sentences? Answer yes or no.
 - (a) _____ The man allied the alliance.
 - (b) _____ The allies disagreed amongst themselves.
 - (c) _____ The kings formed an alliance between their countries.
 - (d) _____ The prisoner told an ally to the judge.
 - (e) _____ Great Britain was an ally of France in the Great War.
9. Tell anything else you know about the word alliance.

Word Meaning test #9

January 31

Name _____ Grade _____ Born: Year _____ Mo. _____ Day _____ No. _____

Test word is ECONOMIC.

1. Do you think you know the meaning of this word? Yes--No.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. The study of economics is directly concerned with which of the following: rainfall, boundaries, the right to vote, wages of employees, usefulness of advertising, wholesale prices, employment of children, occupations of the people, use of radio in schools, cure for cancer, unemployment insurance, tariffs, old age pensions, banking system, capital punishment, literacy, popular music, transportation, prices of farm products, imports and exports, natural resources, football, foreign markets, business profits, religion.
5. Which of the following are economic laws or facts? Answer yes--no.
 - (a) _____ Thou shalt not kill.
 - (b) _____ Price is determined by supply and demand.
 - (c) _____ Ocean transportation is cheaper than land transportation.
 - (d) _____ Dance halls must be closed on Sundays.
 - (e) _____ Bad money drives out good money.
 - (f) _____ Population tends to outrun subsistence.
 - (g) _____ Geography is the study of the physical features of a country.
 - (h) _____ Competition in trade leads to international strife.
 - (i) _____ The automobile industry creates employment.
 - (j) _____ Shakespeare wrote "King Lear."
 - (k) _____ Fashions change from year to year.
 - (l) _____ Agriculture is the most important occupation of the Canadian people.
 - (m) _____ The New York Rangers defeated the Boston Bruins at hockey.
6. Underline in the following list the names of famous economists: Adam Smith, Bernard Shaw, Malthus, Karl Marx, Charlie Chan, Robert Owen, Sydney Webb, Kipling, Major Douglas, Jeremy Bentham.
7. Economic, cheap, economist, economy, extravagant, economical, save, economize, economically, orator, buying.
From the above list of words select a word to fill each of the blanks in the following sentences:
 - (a) A modern government may need the advice of a good _____.
 - (b) The _____ welfare of the people is of great importance.
 - (c) During the depression people have had to practice strict _____.
 - (d) The housewife was _____ in her management of the household.
 - (e) _____ goods are sometimes the dearest in the long run.
 - (f) One must _____ in his expenditures if he wants to _____ his money.
 - (g) _____ speaking Canadians are wealthier than Chinese.
8. The economic conditions of a people may be affected by: (Underline correct answers.) acts of parliament, crop failures, moon's phases, markets for their products, annual precipitation, wars, density of water, tides, climatic conditions, invention of machinery, law of gravitation, prevalence of grasshoppers, forest fires, government policy, grand opera.
9. (a) _____ Are all rich men great economists?
 (b) _____ Could a student who makes good use of his time be called an economist?
 (c) _____ Is it an economic principle that specialization increases production?

Word Meaning Test #10

February 7.

Name _____ Grade _____ Born: Year _____ Mo. _____ Day _____ No. _____

Test Word is INVASION.

1. Do you think you know the meaning of this word? Yes--No.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. Invade is most like trespass, pursue, fight, attack.
Invade is most like approach, advance, encroach, retreat.
Invasion is most like excursion, incursion, conflict, war.
Invasion is most like foray, raid, inroad, defeat.

5. Invasion, invaded, invader, irruption, inroad, incursion, infringe, captured, defeated, foray, excursion, advance, pursue, invasive, eruption.

Fill in each blank in the following sentences with the most suitable word from the above list:

- (a) Fear _____ his mind.
- (b) The enemy made an _____ movement across the border.
- (c) The volcano is in a state of _____.
- (d) A student's selfishness may _____ on the privileges of his companions.
- (e) While searching for insects he _____ a butterfly.
- (f) Some say that recent Dominion legislation has _____ Provincial rights.
- (g) Disease has made a serious _____ into his health.
- (h) In the war in Ethiopia Italy is the _____.
- (i) The League of Nations is opposed to the _____ of Ethiopia by the Italians.

6. Some of the following are examples of invasions, some are not; Write yes or no according to which you think it is.

- (a) _____ The German army occupied and plundered France.
- (b) _____ Many tourists from the United States entered Canada.
- (c) _____ Britain declared war on Germany in 1914.
- (d) _____ Civil war occurred in England in 1642.
- (e) _____ A policeman forced his way into a house to arrest a man.
- (f) _____ A man's cow ate the vegetables in his neighbor's garden.
- (g) _____ A Canadian hockey team makes a tour of Europe.
- (h) _____ Fear of the consequences disturbed his peace of mind.

7. Mark each of the following as true or false:

- (a) _____ An invasion is more permanent than an inroad.
- (b) _____ An army may invade a country without actually crossing its borders.
- (c) _____ An invasion may be peaceful.
- (d) _____ An invasion always results in conquest.
- (e) _____ An invasion may be beneficial to a country.
- (f) _____ An invasion may occur without a formal declaration of war.
- (g) _____ Crime is an invasion of the rights of citizens.
- (h) _____ Columbus invaded America in 1492.
- (i) _____ Christian missionaries have invaded China.
- (j) _____ Japan has pursued an invasive policy toward China.
- (k) _____ Miners invade the mine to dig coal.

Word Meaning Test #11

February 14.

Name _____ Grade _____ Born: Year _____ Month _____ Day _____ No. _____

Test Word is REVOLUTION.

1. Do you think you know the meaning of this word? Yes--no.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. (a) Revolution is most like rebellion, retention, recession, discord.
 (b) Revolution is most like recitation, repetition, strife, rotation.
 (c) Revolution is most like change, charge, reform, repentance.
5. revolution, revolt, rotation, repetition, recession, rebellion, reform, retention, repentance, revolutionist, revolutionary, revolutionize, revolve, discord, strife.
 In the following sentences fill in each blank with the most suitable word from the above list:
 (a) New inventions will undoubtedly _____ our ways of living.
 (b) A century ago, democracy was considered _____.
 (c) A person favoring revolution is a _____.
 (d) Does the Earth _____ about the sun?
 (e) Day and night are caused by the Earth's _____.
 (f) The Red River _____ was led by Louis Riel.
 (g) The meeting broke up in _____.
6. Explain each of the following:
 (a) political revolution---
 (b) Industrial revolution---
 (c) revolution in thought---
 (d) revolution of the earth.----
 (e) revolution of time-----
7. Some of the following are examples of a revolution and some are not. Write yes in front of those that are and no in front of those that are not.
 (a) _____ A boy refuses to obey his parents.
 (b) _____ Steam engines began to be used in transportation.
 (c) _____ In 1789 the French people abolished feudalism.
 (d) _____ A number of citizens protest to the government against a new law.
 (e) _____ Prehistoric man discovered how to make and use fire.
 (f) _____ The race horses went around the track.
 (g) _____ A group of citizens took up arms against the government but were soon defeated.
 (h) _____ The time table was changed after Christmas.
 (i) _____ Darwin's Theory of Evolution altered people's ways of thinking about the origin of man.
 (j) _____ A heavenly body goes around in an orbit.
8. Is the underlined word correctly used, according to its meaning in each of the following sentences?
 (a) _____ The two gases were in a state of revolution.
 (b) _____ Will you please revolutionize the front wheel of my bicycle.
 (c) _____ The invention of the radio had a revolutionary effect on home entertainment.
 (d) _____ Some people believe in a revolutionary policy.
 (e) _____ Man's knowledge increases with the revolution of the years.

Name _____ Grade _____ Born: Year _____ Month _____ Day _____ No. _____

Test Word is CITIZEN.

1. Do you think you know the meaning of this word? Yes No.
2. Use the word correctly in a sentence.
3. Define the word as completely as you can.
4. Explain what is meant by each of the following:

- (a) A citizen of Calgary
- (b) A Canadian citizen
- (c) Citizenry
- (d) Citizenship

5. Name one duty or obligation of citizenship

Name one right or privilege of citizenship

6. DENIZEN, CIVILIAN, RESIDENT, CITIZEN, INHABITANT, OCCUPANT, CITIZENSHIP, CITIZENRY.

Fill in each blank in the following sentences with the most suitable word from the above list.

- (a) A soldier may be a citizen but he is not a _____.
 - (b) While waiting outside the office, I observed the _____ within.
 - (c) Having lived here for seventy years, he is the oldest _____.
 - (d) Fire threatened the life of every _____ in the city.
 - (e) Every _____ should live up to the highest ideals of _____.
 - (f) Having completed his term as Lieutenant-Governor, he returned to ordinary _____ life.
7. Is the underlined word correctly used? Answer YES or NO.
 - (a) _____ The citizenship struck an iceberg.
 - (b) _____ Montreal was cited years ago.
 - (c) _____ The Governor asked the entire citizenship for aid.
 - (d) _____ The citizenry was in favor of the proposal.
 - (e) _____ Many immigrants were citizenized recently.
 8. Answer each of the following questions with YES or NO:
 - (a) _____ Do all Canadian citizens owe allegiance to Edward VIII
 - (b) _____ May women be citizens
 - (c) _____ May young children be citizens
 - (d) _____ Are naturalized foreigners citizens
 - (e) _____ Can a person be a citizen of two countries at the same time
 - (f) _____ May a person never in a city be a citizen
 - (g) _____ Are there citizens in all nations
 - (h) _____ May a person be a tax-payer without being a citizen
 - (i) _____ Is a civilian a citizen
 - (j) _____ Could two brothers be citizens of different countries
 - (k) _____ Could a person living in one country be a citizen of another country
 - (l) _____ Is a person convicted of crime a citizen
 - (m) _____ Are all persons of the same race citizens of the same country
 - (n) _____ Would the children born in Canada of French parents be citizens of Canada.

ADMINISTERING THE TESTS.

Each teacher supervised the administration of the tests in her own class room. Two tests, one prepared by Mr. McLean, the other by myself, were given consecutively on the dates shown on the tests. A uniform procedure was adopted by all teachers. They were to allow the students as much time as they wished, they were to explain, if asked, the meaning of the questions and how they were to be answered. I supervised the administration of the first few tests in order to be as certain as possible that every student knew what he was being asked to do.

The test on the word "State" was submitted to a University class. However, lacking the oral instructions given to the students here, some of the University students found the test slightly vague. A few of the most difficult tests were given to students of grades IV and V to discover what scores would be made by persons having little or no knowledge of the words.

SCORING THE TESTS.

The scoring of the tests offered great difficulty. I found it difficult to decide as to the relative worth of the various types of questions, and the various responses to the questions. For example: What is the relative worth of a synonym correctly selected compared with a definition correctly given? Again, a student is asked to underline the names of civilized countries in a list, but instead of doing so, he writes, "No country is yet civilized."

At first, considering that the ability to use a word in such a way as to indicate knowledge of its meaning was important, I allotted that question a maximum of three points, grading the answer from there down, according to my estimate of the amount of meaning shown in its use. Later, deciding that this question was being over valued, especially in relation to the definition, I reduced the mark to a maximum of one. In either case, a corresponding error score was given if the word was used incorrectly.

Definitions were scored by allotting one point for each item, without setting any fixed error limit. If, instead of a definition, an example of the use of the word was given, a mark was allowed if the previous question had not been answered, but such marks were not credited to the definition in the later analysis. For all other questions, one point was given for each response. Questions not answered were not scored. Scores for knowledge and error were totalled separately. No maximum, possible score was set for any test as a whole.

CLASSIFICATION OF STUDENTS.

The chronological ages of the students were taken as on January 1, 1936. The mental ages were derived from the "Otis Self-Administering Tests of Mental Ability", the Intermediate examination for students in grades VI, VII and VIII; the Higher examination for the High School students. These tests were given about four months after January 1, 1936.

CHAPTER III

SUMMARY OF DATA

The following pages contain the data obtained by Mr. McLean and myself in respect to the total knowledge and error scores.

CLASS SCORES GRADE VI

Student's Number	Chronological Age	I. Q.	Mental Age	Rank in Mental Age.	Average K Score (H)	Average K Score (S)	Average E. Score (H)
1	11-8	101	12-2	22	13.8	14.3	10.7
2	12-4	99	12-6	18	13.3	15.0	15.4
3	12-0	91	11-0	27.5	14.1	11.2	11.2
4	13-11	95	12-11	13.5	16.2	15.5	12.1
5	12-2	89	10-10	29	11.2	14.8	17.5
6	14-10	81	11-5	25	16.4	16.2	15.7
7	13-11	97	13-3	10.5	13.5	12.2	10.4
8	12-10	98	12-8	16	9.0	10.3	9.1
9	12-8	98	12-6	18	16.4	15.8	13.1
10	12-4	84	10-4	30.5	11.2	11.5	12.5
11	12-11	107	13-3	10.5	13.7	12.4	10.6
12	12-6	90	11-3	26	11.7	9.7	14.1
13	14-10	95	13-6	8	16.6	16.9	12.0
14	12-4	97	12-2	22	12.6	14.2	12.2
15	12-11	100	13-1	12	15.3	15.9	11.0
16	12-8	99	12-6	18	15.3	15.6	12.6
17	12-4	84	10-4	30.5	13.5	15.8	14.8
18	12-11	85	11-0	27.5	13.6	11.8	14.2
19	11-11	112	14-4	4	15.7	15.3	11.2
20	11-8	106	12-11	13.5	16.3	17.7	10.5
21	13-10	77	10-3	32	13.2	11.4	13.2
22	11-4	122	15-2	1	19.3	15.8	12.7
23	11-6	118	14-8	2	13.4	12.2	7.7
24	11-0	107	13-5	8	14.6	14.8	11.3
25	12-7	107	14-0	5	16.8	14.8	9.5
26	14-9	88	12-4	20	12.0	11.7	9.1
27	12-11	98	12-10	15	9.4	12.0	8.8
28	14-9	85	12-0	24	13.2	12.3	12.6
29	13-7	99	13-5	8	16.6	14.6	12.1
30	13-6	106	14-6	3	12.7	12.0	6.3
31	13-7	101	13-10	6	14.2	11.1	12.4
32	13-4	96	12-2	22	11.8	12.0	10.9
N-32	12-10	95.2	12-6		13.9	13.7	11.8

CLASS SCORES GRADE VI Continued.

Student's number	Average E. Score (S)	Rank in K Scores (H)	Rank in K Scores (S)	Rank in E Scores (H)	Rank in E Scores (S)	Ratio K/E (H)	Ratio K/E (S)	Language spoken at home.
1	10.9	15	16	10	20	1.28	1.31	Eng.
2	11.6	21	11	30	24	0.86	1.28	Ital.
3	10.3	14	29	13.5	16.5	1.25	1.08	Ukr.
4	11.4	7	9	17.5	22.5	1.33	1.35	Ital.
5	13.0	29.5	13	32	30	0.64	1.13	Ital.
6	14.2	4.5	3	31	31	1.04	1.14	Ital.
7	8.8	18.5	18	7	11.5	1.20	1.43	Slav.
8	7.6	32	31	4.5	6	0.98	1.35	Slav.
9	10.8	4.5	6	25	19	1.25	1.46	Eng.
10	10.6	29.5	27	21	18	0.89	1.08	Pol.
11	8.8	16	19	9	11.5	1.29	1.40	Hung.
12	11.8	27.5	32	27	26.5	0.82	0.82	Ital.
13	10.3	3	2	16	16.5	1.38	1.64	Eng.
14	9.6	24	17	19	15	1.03	1.47	Ital.
15	8.0	10.5	4	12	8	1.39	1.98	Eng.
16	9.5	10.5	8	22.5	14	1.21	1.64	Eng.
17	12.8	18.5	6	29	29	0.91	1.23	Ger.
18	14.4	17	25	28	32	0.95	0.81	Ital.
19	11.8	9	10	13.5	26.5	1.40	1.20	Eng.
20	6.7	6	1	8	3	1.55	2.64	Pol.
21	11.9	22.5	28	26	28	1.00	0.95	Hung.
22	11.7	1	6	24	25	1.51	1.34	Eng.
23	6.3	20	21	2	2	1.74	1.93	Belg.
24	8.7	12	13	15	10	1.29	1.70	Ukr.
25	7.7	2	13	6	7	1.76	1.92	Ukr.
26	7.3	25	26	4.5	5	1.31	1.60	Ukr.
27	7.0	31	23	3	4	1.06	1.71	Eng.
28	9.3	22.5	20	22.5	13	1.04	1.32	Eng.
29	11.3	8	15	17.5	21	1.32	1.20	Ital.
30	3.2	27.5	23	1	1	1.85	3.75	Eng.
31	8.4	13	30	20	9	1.14	1.32	Ukr.
32	11.4	26	23	11	22.5	1.08	1.05	Boh.
33	9.9					1.17	1.38	

Class Scores

Grade VII

Student's Number	Chronological Age	I. Q.	Mental age.	Rank in Mental age.	Average K Score (H)	Average K Score (S)	Average K Score (H)
1	14-2	101	14-2	4	21.1	20.0	13.5
2	13-2	82	11-10	26	17.2	17.5	14.5
3	12-6	105	13-5	13	19.7	18.8	10.7
4	12-8	---	-----	--	21.6	21.4	11.2
5	12-11	95	11-6	28.5	18.3	17.1	13.2
7	14-2	79	10-10	31	16.7	17.1	15.1
8	13-0	103	13-5	13	17.6	17.6	12.1
9	12-6	100	12-8	18.5	15.2	16.5	11.6
10	12-5	114	13-10	7	17.9	17.3	12.6
11	13-1	99	12-8	18.5	15.5	16.9	10.9
12	13-7	94	12-10	24.5	19.0	20.6	13.8
13	13-6	102	13-7	10	17.3	19.5	10.6
14	13-5	96	12-10	16.5	19.3	19.0	13.3
15	14-4	86	12-0	24.5	21.4	17.3	12.9
16	12-10	106	13-10	7	23.5	23.1	10.9
17	12-4	117	15-5	2	22.8	23.1	10.3
19	14-11	91	12-11	15	18.7	15.9	13.4
20	12-11	103	13-5	13	22.0	19.1	11.0
21	13-11	89	12-1	22.5	17.6	19.3	13.3
22	13-0	85	11-6	28.5	16.6	17.2	11.0
23	14-0	---	-----	----	18.7	19.4	12.1
24	12-6	107	13-10	7	19.3	19.0	11.5
25	12-9	104	13-7	10	22.2	24.9	13.9
26	14-1	80	11-0	30	17.4	19.5	12.6
27	15-0	85	12-1	22.5	16.3	14.9	10.2
28-	13-3	98	13-7	10	22.5	21.6	8.5
29	14-10	88	12-4	21	14.5	14.6	11.1
30	12-6	118	15-11	1	28.6	25.7	6.6
31	12-4	112	14-6	3	20.7	18.7	11.6
32	13-7	87	11-8	27	19.8	19.9	12.7
33	13-1	105	14-0	5	20.2	18.9	12.4
34	12-5	---	-----	--	18.6	15.3	7.3
35	12-10	99	12-10	16.5	15.1	16.2	9.7
36	15-1	---	-----	---	17.9	17.1	14.2
37	13-8	93	12-6	20	18.0	18.9	13.8
38	14-9	---	-----	---	15.1	16.4	16.9
41-36	13-5	97.6	13-10	6-8	19.0	19.0	12.0

Class Scores

Grade VII continued.

Student's Number	Average E Score (S)	Rank in K Scores (H)	Rank in K Scores (S)	Rank in E Scores (H)	Rank in E Scores (S)	Ratio K/E (H)	Ratio K/E (S)	Language spoken at home.
1	14.0	9	8	29	36	1.56	1.42	Ital.
2	10.8	28	22	34	20.5	1.11	1.62	Fr.
3	9.6	13	19	8.5	11.5	1.84	1.95	Fr.
4	7.1	7	6	14	3	1.92	3.01	Eng.
6	13.4	20	27	25	35	1.38	1.27	Ital.
7	12.1	29	27	35	30	1.10	1.41	Eng.
8	9.7	24.5	21	18.5	13	1.45	1.81	Eng.
9	8.8	33	30	16.5	7	1.31	1.87	Ital.
10	13.1	22.5	23.5	21.5	34	1.42	1.32	Ital.
11	9.3	32	29	8.5	10	1.44	1.81	Hung.
12	10.6	16	7	30.5	19	1.37	1.94	Boh.
13	6.8	27	10.5	7	2	1.63	2.96	Slav.
14	11.1	14.5	15.5	26.5	22.5	1.45	1.71	Slav.
15	11.4	8	23.5	24	25	1.68	1.51	Eng.
16	10.1	2	3.5	10	16	2.15	2.28	Eng.
17	10.2	3	3.5	6	17	2.21	2.26	Eng.
19	10.5	17.5	33	28	18	1.35	1.51	Eng.
20	11.1	6	14	11.5	22.5	2.00	2.72	Boh.
21	10.8	24.5	13	26.5	20.5	1.32	1.78	Eng.
22	9.9	30	25	11.5	15	1.50	1.73	Eng.
23	11.3	17.5	12	18.5	24	1.54	1.71	Eng.
24	9.2	14.5	15.5	15	9	1.68	2.06	Ital.
25	9.8	5	2	32	14	1.60	2.54	Eng.
26	11.5	26	10.5	21.5	26.5	1.38	1.69	Pol.
27	9.6	31	35	5	11.5	1.59	1.55	Eng.
28	9.0	4	5	3	8	2.64	2.40	Eng.
29	12.2	36	36	13	31	1.30	1.19	Eng.
30	7.6	1	1	1	4	4.33	3.38	Ukr.
31	8.1	10	20	16.5	6	1.78	2.30	Ukr.
32	11.5	12	9	23	26.5	1.55	1.73	Slav.
33	12.4	11	17.5	20	32	1.62	1.52	Ital.
34	5.1	19	34	2	1	2.54	3.00	Eng.
35	7.7	34.5	32	4	5	1.55	2.10	Eng.
36	12.8	22.5	27	33	33	1.26	1.33	Eng.
37	11.8	21	17.5	30.5	28	1.30	1.60	Ukr.
38	12.0	34.5	31	36	29	0.89	1.36	Eng.
W-36	10.3					1.58	1.84	

CLASS SCORES

GRADE VIII

Student's Number	Chronological Age.	I. Q.	Mental Age	Rank in Mental Age.	Average K Score (H)	Average K Score (S)	Average E Score (H)
1	13-7	109	15-2	10	21.4	19.0	11.7
2	14-7	110	16-3	4	21.8	17.8	10.7
3	14-4	110	16-1	5.5	24.2	22.3	7.5
5	14-5	102	14-6	12	20.1	19.8	11.0
6	13-6	103	14-2	18	20.5	19.2	9.4
7	15-11	96	14-4	15	17.2	18.8	13.4
8	15-6	106	16-1	5.5	21.9	21.5	11.6
9	15-4	102	14-6	12	21.5	15.8	8.1
10	14-4	---	----	----	18.9	19.4	12.3
11	14-11	99	14-4	15	17.0	17.5	10.7
12	14-8	108	15-11	7.5	22.1	24.0	9.7
13	14-2	98	13-7	20	18.5	21.1	11.8
14	14-7	100	14-4	15	23.5	20.9	10.2
15	13-7	116	16-8	2	26.0	26.4	6.6
16	13-7	110	15-5	9	15.9	16.0	8.0
17	15-2	97	14-2	18	18.7	19.1	13.3
18	13-10	117	16-11	1	22.3	22.1	9.1
19	14-0	110	15-11	7.5	25.0	24.1	9.3
20	14-9	101	14-6	12	24.3	20.2	9.1
21	11-1	123	16-6	3	19.4	18.4	4.5
22	16-0	95	14-2	18	18.7	17.8	10.3
23	15-9	89	13-1	21	17.9	16.3	10.0
N-22	14-8	104.8	15-2		20.8	19.9	9.8
			GRADE IX				
1	15-0	98	14-2	19	20.2	17.8	8.5
2	14-0	107	15-0	16	16.5	18.8	7.3
3	18-2	97	14-10	17	20.9	23.5	7.9
4	15-0	104	15-2	14	21.8	21.9	9.3
5	13-7	112	15-8	8.5	22.3	22.0	10.1
6	15-7	---	----	----	18.5	24.0	9.2
7	14-7	112	16-3	5	23.2	22.9	7.2
8	17-1	110	16-9	2	27.9	26.3	7.4
9	14-1	115	16-3	5	19.4	19.4	8.6
10	16-2	---	----	----	21.2	24.4	10.2
11	15-0	105	15-4	11	22.8	25.5	11.2
12	17-6	---	----	----	21.6	25.2	12.4
13	16-7	89	13-3	20.5	20.6	20.0	8.7
14	14-10	104	15-2	14	20.2	20.9	8.7
15	14-2	112	16-0	7	24.0	23.5	10.3
16	16-1	102	15-4	11	15.8	15.7	7.9
17	15-1	111	16-3	5	21.8	25.2	11.2
18	15-6	106	15-8	8.5	19.8	22.3	10.9
19	15-4	103	15-2	14	22.0	22.7	7.6
20	15-4	---	----	----	20.8	22.7	4.7
21	16-3	90	13-3	20.5	16.0	17.4	9.0
22	15-7	115	17-0	1	25.1	28.1	8.1
24	16-5	---	----	----	27.5	24.0	3.5
25	16-0	95	14-4	18	15.8	18.4	5.7
26	14-7	106	15-4	11	22.1	20.9	12.1
27	15-3	111	16-5	3	21.1	24.7	8.1
N-26	15-6	105.0	15-4	.	21.1	21.9	8.7

CLASS SCORES

GRADE VIII CONTINUED

Student's Number	Average E Score (S)	Rank in K Scores (H)	Rank in K Scores (S)	Rank in E Scores (H)	Rank in E Scores (S)	Ratio K/E (H)	Ratio K/E (S)	Language spoken at home.
1	9.9	11	14	18	18.5	1.82	1.91	Eng.
2	9.5	9	17.5	14.5	13.5	2.03	1.87	Eng.
3	6.3	4	4	3	3	3.22	3.54	Eng.
5	10.8	13	10	16	21	1.82	1.83	Eng.
6	7.9	12	12	9	7	2.18	2.43	Ital.
7	9.5	20	15	22	13.5	1.28	1.97	Slav.
8	9.5	8	6	17	13.5	1.88	2.26	Eng.
9	9.9	10	22	5	18.5	2.65	1.59	Eng.
10	9.8	15	11	20	18	1.54	1.97	Boh.
11	9.5	21	19	14.5	13.5	1.58	1.84	Ger.
12	9.0	7	3	10	11	2.27	2.66	Eng.
13	9.5	18	7	19	13.5	1.56	2.22	Ital.
14	9.2	5	8	12	12	2.30	2.27	Pol.
15	6.1	1	1	2	2	3.94	4.32	Eng.
16	6.7	22	21	4	4	1.98	2.38	Eng.
17	10.9	16.5	13	21	22	1.41	1.75	Boh.
18	8.7	6	5	6.5	9	2.45	2.54	Ukr.
19	7.5	2	2	8	5	2.68	3.21	Eng.
20	8.9	3	9	6.5	10	2.67	2.27	Eng.
21	4.5	14	16	1	1	4.31	4.08	Eng.
22	8.0	16.5	17.5	13	8	1.81	2.22	Eng.
23	7.7	19	20	11	6	1.79	2.11	Eng.
22	9.6					2.12	2.07	
GRADE IX CONTINUED								
1	7.8	18.5	24	13	22	2.4	2.3	Eng.
2	5.3	23	22	5	8	2.3	3.5	Fr.
3	5.2	15	10.5	8.5	5.5	2.6	4.5	Slav.
4	7.4	10.5	17	19	21	2.3	3.0	Ital.
5	9.0	7	16	20	25	2.2	2.4	Ital.
6	6.5	22	8.5	18	14	2.0	3.7	Eng.
7	5.2	5	12	4	5.5	3.2	4.4	Eng.
8	6.1	1	2	6	12	3.8	4.3	Eng.
9	5.1	21	21	14	3.5	2.3	3.8	Eng.
10	5.4	13	7	21	9.5	2.2	4.5	Eng.
11	5.7	6	3	24.5	11	2.0	4.5	Eng.
12	12.3	12	4.5	26	26	1.7	2.1	Ger.
13	6.9	17	20	15.5	18	2.4	2.9	Eng.
14	6.8	18.5	18.5	15.5	15.5	2.3	3.1	Slav.
15	8.7	4	10.5	22	24	2.3	2.7	Ital.
16	5.1	24.5	26	8.5	3.5	2.0	3.1	Eng.
17	6.8	10.5	4.5	24.5	15.5	1.9	3.7	Eng.
18	8.8	20	15	23	15.5	1.8	2.5	Pol.
19	5.2	9	13.5	7	5.5	2.9	4.4	Eng.
20	7.0	16	13.5	2	19	4.4	3.2	Eng.
21	7.2	26	25	17	20	1.8	2.4	Eng.
22	5.4	3	1	11.5	9.5	3.1	5.2	Eng.
24	5.0	2	8.5	1	2	7.9	4.8	Eng.
25	3.7	24.5	23	3	1	2.8	5.0	Ger.
26	8.0	8	18.5	25	23	1.8	2.6	Ital.
27	6.4	14	6	11.5	13	2.6	3.9	Eng.
26	6.6					2.4	3.3	

CLASS SCORES

GRADE X

Student's Number	Chronological Age.	I. Q.	Mental Age	Rank in Mental Age.	Average K Score (H)	Average K Score (S)	Average E Score (H)
1	14-9	117	17-0	1	23.7	27.1	5.8
2	16-1	112	16-9	2	19.8	23.9	6.5
3	16-4	109	16-5	3	20.6	22.3	10.2
4	15-9	107	16-0	7	24.3	27.1	8.9
6	15-7	109	16-3	4	26.5	27.8	8.2
7	16-2	106	16-0	7	25.6	26.7	10.1
8	16-8	105	16-0	7	19.7	23.5	9.7
9	15-10	---	---	-	18.5	22.9	8.3
10	15-11	101	15-2	9	23.5	24.3	7.8
12	15-3	---	---	-	22.3	18.0	9.0
13	15-7	109	16-2	5	20.5	24.7	11.2
30	15-7	101	15-0	10	18.3	20.1	5.6
N-12	15-10	107.6	16-5		21.9	24.0	8.5
GRADE XI							
14	17-5	103	15-10	11	24.1	25.7	8.4
15	16-4	117	17-6	2	29.3	30.7	5.7
16	15-10	120	17-9	1	26.9	29.4	6.0
17	16-3	116	17-3	3	26.5	26.7	6.8
18	17-2	102	15-8	12	21.8	24.3	9.4
19	16-9	108	16-5	8	28.8	29.4	7.2
20	17-11	104	16-0	10	29.2	32.5	7.5
21	16-9	102	15-6	13	22.2	27.7	9.0
22	17-7	112	17-0	4.5	26.3	26.9	4.8
23	16-1	100	15-0	14	24.4	27.9	8.0
24	16-8	107	16-3	9	26.5	26.0	4.7
25	15-6	111	16-9	7	28.2	28.3	5.8
26	17-9	89	13-5	15	22.1	25.4	9.0
27	19-6	---	---	---	21.7	21.4	7.4
28	16-2	114	17-0	4.5	27.1	31.5	7.4
29	16-3	113	16-10	6	24.4	26.6	6.0
N-16	16-11	107.9	16-1		25.7	27.5	7.1

CLASS SCORES

GRADE X CONTINUED

Student's Number	Average E Score (S)	Rank in K Scores (H)	Rank in K Scores (S)	Rank in E Scores (H)	Rank in E Scores (S)	Ratio K/E (H)	Ratio K/E (S)	Language Spoken at home.
1	4.4	4	2.5	3	3	3.5	6.2	Ital.
2	4.9	9	7	2	4	3.0	4.9	Ger.
3	9.1	7	10	11	12	2.0	2.5	Eng.
4	8.0	3	2.5	7	11	2.7	3.4	Eng.
6	6.6	1	1	5	7	3.2	4.2	Eng.
7	7.2	2	4	10	9	2.5	3.7	Ger.
8	7.0	10	2	9	8	2.0	3.4	Eng.
9	6.1	11	9	6	5	2.2	3.8	Eng.
10	7.3	5	6	4	10	3.0	3.3	Eng.
12	2.7	6	12	8	1	2.5	6.7	Eng.
13	6.5	8	5	12	6	1.8	3.8	Eng.
30	4.0	12	11	1	2	3.3	5.0	Fin.
N-12	6.2					2.6	3.9	
		GRADE XI CONTINUED						
14	6.2	12	13	13	15	2.9	4.1	Ital.
15	3.7	1	3	3	4	5.1	8.3	Eng.
16	3.6	6	4.5	5.5	3	4.5	8.2	Fr.
17	4.3	7.5	10	7	6	3.9	6.2	Eng.
18	6.5	15	15	16	16	2.3	3.7	Eng.
19	4.5	3	4.5	8	7	4.0	6.5	Ital.
20	5.3	2	1	11	10	3.9	6.1	Eng.
21	5.7	13	8	14.5	13	2.5	4.9	Eng.
22	3.1	9	9	2	2	5.5	8.7	Eng.
23	5.5	10.5	7	12	11	3.1	5.1	Eng.
24	4.2	7.5	12	1	5	5.6	6.9	Eng.
25	3.0	4	6	4	1	4.9	9.4	Ital.
26	5.6	14	14	14.5	12	2.5	4.5	Eng.
27	6.0	16	16	9.5	14	2.9	3.6	Eng.
28	4.9	5	2	9.5	9	3.7	6.4	Eng.
29	4.7	10.5	11	5.5	8	4.1	5.7	Eng.
N-16	4.8					3.6	5.8	

CLASS SCORES

GRADE XII

Student's Number	Chronological Age	I.Q.	Mental Age	Rank in Mental Age.	Average K Score (H)	Average L Score (S)	Average F Score (H)
1	20-9	---	-----	-----	25.2	27.0	7.2
2	22-4	107	16-5	12.5	25.7	31.5	7.7
3	18-10	114	17-3	5.5	25.6	27.0	7.1
4	17-10	114	17-3	5.5	27.6	28.3	5.2
5	17-8	116	17-6	4	31.2	32.7	6.0
6	17-2	99	15-2	16	22.3	22.7	7.0
7	17-5	110	16-9	9	22.9	24.4	5.8
8	16-7	130	18-11	1	28.9	28.8	5.0
9	18-11	119	17-11	3	23.2	30.6	8.6
10	17-8	108	16-6	10.5	24.1	24.8	6.5
11	17-9	95	14-6	18.5	23.5	26.1	9.2
12	20-4	107	16-5	12.5	26.0	28.4	6.2
13	17-4	---	-----	-----	24.3	29.2	5.7
14	17-7	108	16-6	10.5	24.5	24.2	6.8
15	19-10	---	-----	-----	24.2	29.7	6.2
16	19-10	111	16-10	8	26.5	26.8	6.3
17	18-3	96	14-8	17	24.2	27.3	9.1
18	18-8	112	17-0	7	30.2	28.3	6.3
19	18-6	104	16-0	14	26.2	26.7	6.9
20	17-4	122	18-3	2	28.4	29.6	6.7
21	18-5	100	15-4	15	22.9	24.8	8.1
22	17-11	95	14-6	18.5	22.5	26.6	6.6
N-22	18-6	108.7	16-6		25.5	27.5	6.9

Student's Number	Average F Score (S)	Rank in K Scores (H)	Rank in K Scores (S)	Rank in F Scores (H)	Rank in F Scores (S)	Ratio K/F (H)	Ratio K/F (S)	Language spoken at home.
1	5.3	11	12.5	17	14	3.5	5.1	Eng.
2	4.5	9	2	18	8.5	3.3	7.0	Ger.
3	5.1	10	12.5	16	12	3.6	5.3	Eng.
4	4.1	5	9.5	2	5	5.3	6.9	Eng.
5	3.9	1	1	5	4	5.2	8.4	Eng.
6	5.8	22	22	15	20	3.2	3.9	Ital.
7	5.0	19.5	20	4	11	3.9	4.9	Eng.
8	4.3	3	7	1	7	5.8	6.7	Eng.
9	3.6	18	3	20	3	2.7	8.5	Eng.
10	4.6	16	18.5	10	10	3.7	5.4	Ukr.
11	5.6	17	17	22	17	2.6	4.7	Hung.
12	3.3	8	8	6.5	2	4.2	8.6	Eng.
13	2.5	13	6	3	1	4.3	11.6	Ukr.
14	5.4	12	21	13	15.5	3.6	4.5	Eng.
15	4.5	14.5	4	6.5	8.5	3.9	6.6	Eng.
16	4.2	6	14	8.5	6	4.2	6.4	Eng.
17	6.6	14.5	11	21	22	2.7	4.1	Eng.
18	5.4	2	9.5	8.5	15.5	4.8	5.2	Eng.
19	5.7	7	15	14	18.5	3.8	4.7	Ukr.
20	6.0	4	5.	12	21	4.2	4.9	Ukr.
21	5.2	19.5	18.5	19	13	2.8	4.8	Ger.
22	5.7	21	16	11	18.5	3.4	4.7	Eng.
	4.8					3.7	5.7	

CHAPTER IV

ANALYSIS OF DATA

Correlations within the grades

The following table was calculated from Pearson's formula for rank correlations.

TABLE A
A TABLE OF CORRELATIONS

Rankings Correlated	VI	VII	VIII	IX	X	XI	XII
M.A. and K(H)	.45	.51	.58	.42	.02	.64	.49
M.A. and K(S)	.27	.38	.49	.40	.24	.49	.42
M.A. and E(H)	.62	.28	.53	.02	-.46	.72	.39
M.A. and E(S)	.31	.22	.37	-.24	-.13	.75	.36
K(H) and K(S)	.72	.77	.75	.70	.76	.89	.57
E(H) and E(S)	.81	.70	.78	.73	.50	.91	.55
K(H) and E(H)	-.11	-.10	.48	-.01	-.16	.61	.45
K(S) and E(S)	-.26	.13	.24	-.18	-.34	.52	.53

Explanation of abbreviations.

M. A. ---Mental Age.

K. ---Knowledge Scores.

E. ---Error Scores.

H. ---Tests on words chosen from history.

S. ---Tests on words chosen from science.

Rankings were arranged in each grade as follows:

M.A. --- Highest to lowest.

K. --- Highest to lowest.

E. --- Lowest to highest.

According to the rankings, a positive correlation for E. and M.A. or E. and K. indicates that E. decreases as M.A. or K. increases. Where K. is correlated in the table with any variable except E., a positive correlation indicates that the two variables increase or decrease together.

THE KNOWLEDGE SCORES

The knowledge scores have been classified in three ways.

Firstly, the mean knowledge score for each grade was determined by taking the sum of the mean knowledge scores of the individual pupils in each grade and dividing this sum by the number of pupils in the grade. Secondly, the students were grouped according to chronological age, the intervals being six months, and the mean score of each age group determined. Finally, the students were classified according to mental age, the intervals also being six months, and the mean score of each group was determined.

Tables 1, 2, 3, and the corresponding graphs show the results of these analyses.

TABLE I
GROWTH OF KNOWLEDGE BY GRADES

Grade	VI	VII	VIII	IX	X	XI	XII
No. of Students	32	36	22	26	12	16	22
K. Scores (Hist.)	13.9	19.0	20.8	21.1	21.9	25.7	25.5
K. Scores (Sc.)	13.7	19.0	19.9	21.9	24.0	27.5	27.5

TABLE II
GROWTH OF KNOWLEDGE BY CHRONOLOGICAL AGE

Chronological Age Intervals. Years & Months.	No. of Students	Mean Knowledge Score (Hist.)	Mean Knowledge Score Science.
11.0---11.5	4	16.9	15.1
11.6---11.11	4	14.8	14.9
12.0---12.5	9	15.8	16.2
12.6---12.11	19	17.2	16.8
13.0---13.5	10	17.8	17.9
13.6---13.11	15	17.5	17.3
14.0---14.5	13	20.6	20.4
14.6---14.11	16	19.4	18.8
15.0---15.5	13	20.1	19.9
15.6---15.11	14	21.9	24.0
16.0---16.5	12	23.2	24.9
16.6---16.11	5	24.9	25.5
17.0---17.5	8	23.5	25.0
17.6---17.11	11	25.0	27.3
18.0---18.5	3	22.7	25.2
18.6---18.11	4	26.3	28.1
19.0---19.5	--	---	---
19.6---19.11	3	24.1	26.0
20.0---20.5	1	26.0	28.4
20.6---20.11	1	25.2	27.0

TABLE III
GROWTH OF KNOWLEDGE BY MENTAL AGE GROUPS

Mental Age Intervals.	No. of Students	Mean Knowledge Scores (Hist.)	Mean Knowledge Scores Science.
10.0---10.5	3	12.6	12.9
10.6---10.11	2	14.0	16.0
11.0---11.5	5	14.6	13.7
11.6---11.11	4	18.0	17.9
12.0---12.5	10	15.2	15.1
12.6---12.11	13	15.2	15.8
13.0---13.5	13	17.4	17.1
13.6---13.11	8	19.4	19.7
14.0---14.5	12	18.8	18.2
14.6---14.11	10	20.3	20.2
15.0---15.5	15	20.8	21.3
15.6---15.11	8	23.2	24.5
16.0---16.5	20	23.9	25.2
16.6---16.11	11	24.2	24.7
17.0---17.5	8	26.5	28.0
17.6---17.11	4	27.4	30.9
18.0---18.5	1	28.4	29.6
18.6---18.11	1	28.9	28.8



Figure 1.-Growth of knowledge by grades



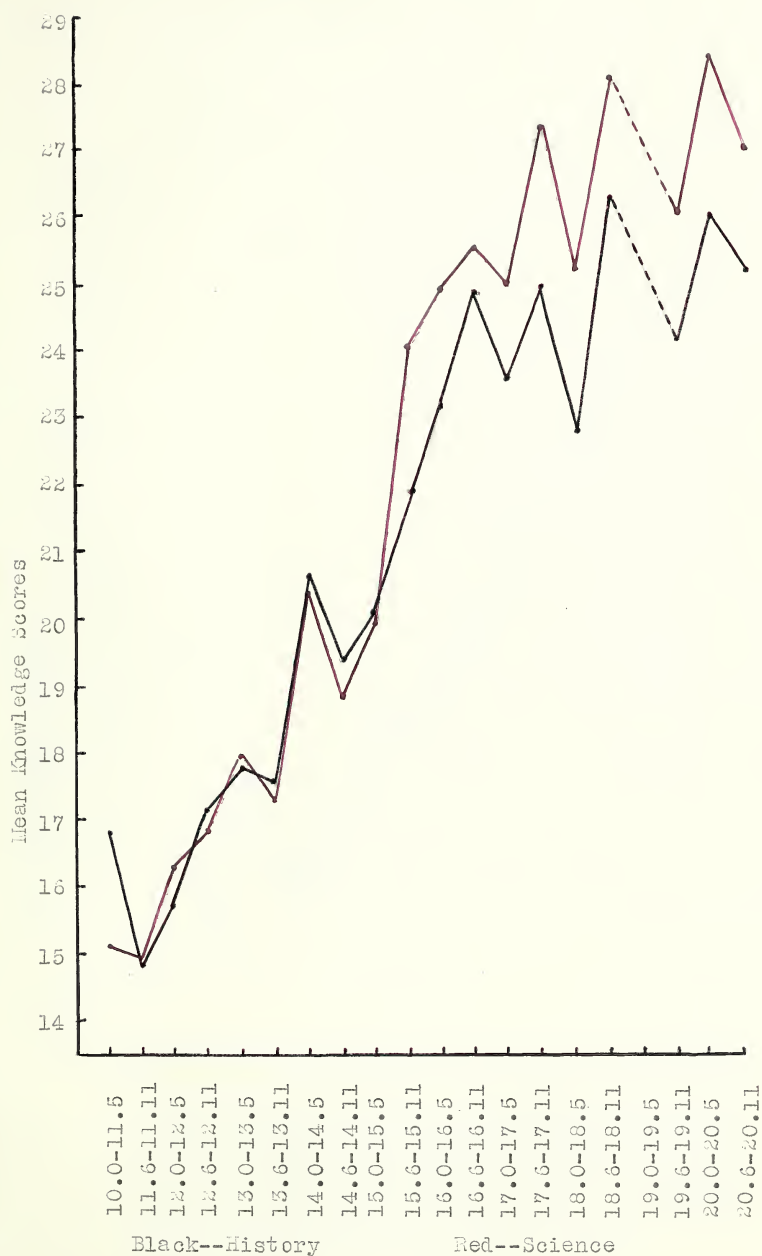


Figure 2.- Growth of knowledge by chronological age

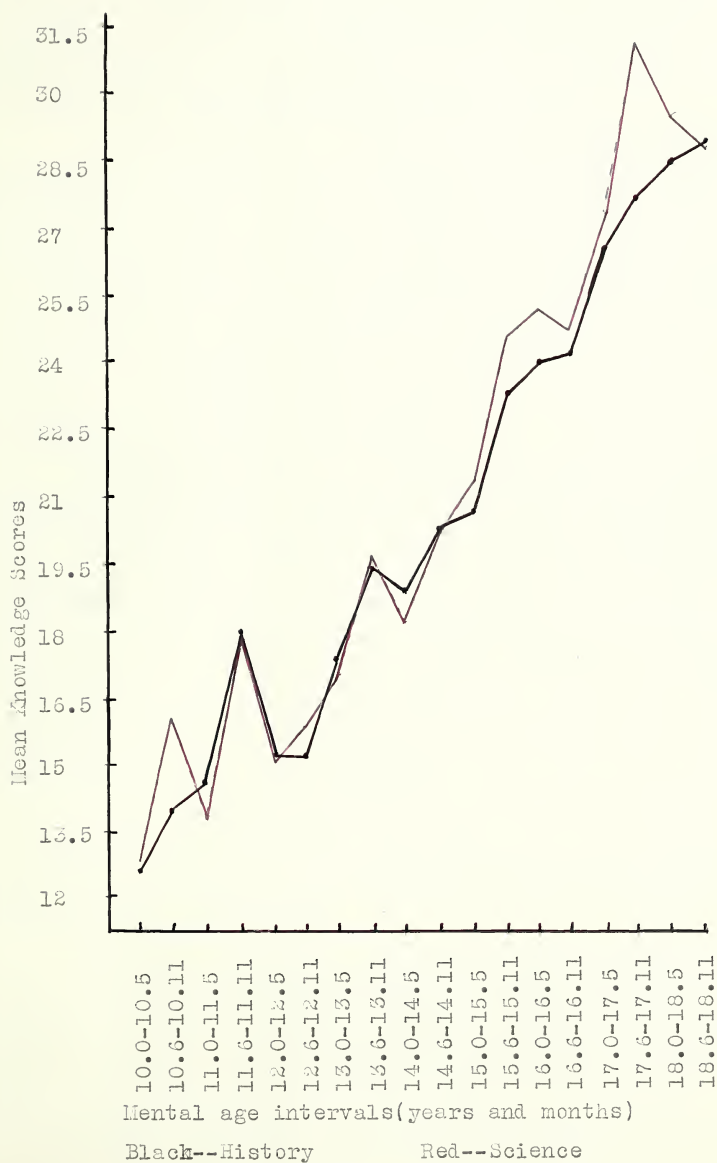


Figure 3.- Growth of knowledge by mental age

From Table I it appears that the increase in knowledge of the words tested was greatest from grades VI to VII, only slightly less from grades X to XI, and much less elsewhere. From grade XI to XII there is a decline. One explanation of the relatively poor score made by grade XII may be that, as a class, it was below average in school work. Similar variations in ability or in industriousness may have occurred in other grades. The sampling was small and varied in the different grades.

Knowledge seems to increase fairly steadily up to a chronological age of about seventeen, after which the increase is both less and very irregular. One explanation may be that students in the higher chronological age groups are those of lesser ability, many of whom are repeating part of their school work. In any case, many of the irregularities are probably due to the small sampling, especially in the upper age groups.

Knowledge seems to increase more rapidly and more uniformly with increasing mental age than it does with increasing chronological age. The scores on the two sets of tests also show greater agreement. There is apparently no such slowing down in the acquisition of knowledge at the higher mental age levels as was observable at the higher grade and chronological age levels. It should be noted that the mental ages as given may not be accurate. In the first place, they are based on only one test; in the second place, it is a condition of the Otis Tests that scores made on them can be translated into mental ages only approximately for all except normal individuals.

The question arises whether the knowledge scores as given here are truly indicative of knowledge, even assuming that the tests are fair. In marking the tests, I discovered that many of the younger students were merely guessing the answers. There is no objection to guessing, especially when resulting from at least limited knowledge, but certainly "pure" guessing should not be credited either as knowledge or error. In order to discover

more accurately just what scores would be made by students having little or no knowledge of the words, Mr. McLean and I gave five of the tests this term to grades IV and V under the same conditions and with the same instructions as for the higher grades. They were told to do their best, that is, they were not encouraged to guess blindly. Table IIIa shows the scores which they made on these tests.

TABLE IIIA
SHOWING SCORES MADE BY GRADES IV AND V
ON FIVE OF THE TEST WORDS.

Grade	IV	V
Mean Knowledge Score	12.1	16.6
Mean Error Score	12.4	12.3
Knowledge--Error Ratio	.98	1.4

This table shows that students who are merely guessing are able to make a knowledge score not far short of that made by grade VI. That the grade IV students were really guessing, without possessing any knowledge of the words is indicated in several ways. Before they wrote the tests, they claimed to have no knowledge of the words; in this connection, the words selected for their tests were those considered least likely to be known. Later, they were orally questioned by their teacher with respect to the answers they had given, and she was led to believe that they had no actual knowledge of the words. Also, examination of the answers of both grades IV and V showed that in no case was a student able to use the word correctly in a sentence which showed an understanding of its meaning or to define the words. Lastly, the mean error score of the Grade IV pupils is almost the same as their mean knowledge score.

Just how much of the knowledge score made by the grades is the result of actual knowledge, and how much could result from "pure" guessing? In grade IV there is assumed to be no actual knowledge, and we note that K-E (knowledge score minus error score) is equal to zero. Grade V children, who did claim to have some knowledge of the words, made a mean knowledge score in excess of their mean error score. In the case of grade IV, guessing has

augmented equally the knowledge and the error scores. Then allowing an equal number of points for guessing in both knowledge and error scores, by subtracting the error score from the knowledge score, we would have left the minimum knowledge content of the knowledge score. If the scores were not affected by guessing, then the knowledge score represents actual knowledge. This means that the score representing actual knowledge lies somewhere within the limits indicated by K and K--E. For the different grades this range is as shown in Table IIIb and the accompanying figure.

Still allowing equal points for guessing in the knowledge and error scores, it follows that the part of the knowledge score which results from guessing could not exceed the error score. Tables IV, V, and VI show that the mean error scores decrease with advancing grade, chronological age and mental age. This means that the possible range of guessing is narrowing at upper grade and age levels. It follows that the knowledge scores at these higher age and grade levels is more and more indicative of actual knowledge, and that at the lower age and grade levels the reverse is true. Hence it is very likely that the true rate of increase in actual knowledge is greater than the rate of increase shown in Tables I, II, and III.

TABLE IIIb

SHOWING THE PROBABLE RANGE OF ACTUAL KNOWLEDGE

GRADE	VI	VII	VIII	IX	X	XI	XII
K Score (S)	13.7	19.0	19.9	21.9	24.0	27.5	27.5
E Score (S)	9.9	10.3	9.6	6.6	6.2	4.8	6.9
K-E Score (S)	3.8	8.7	10.3	15.3	17.8	22.7	20.6
K Score (H)	13.9	19.0	20.8	21.1	21.9	25.7	25.5
E Score (H)	11.8	12.0	9.8	8.7	8.5	7.1	6.9
K-E Score (H)	2.1	7.0	11.0	12.4	13.4	18.6	18.6

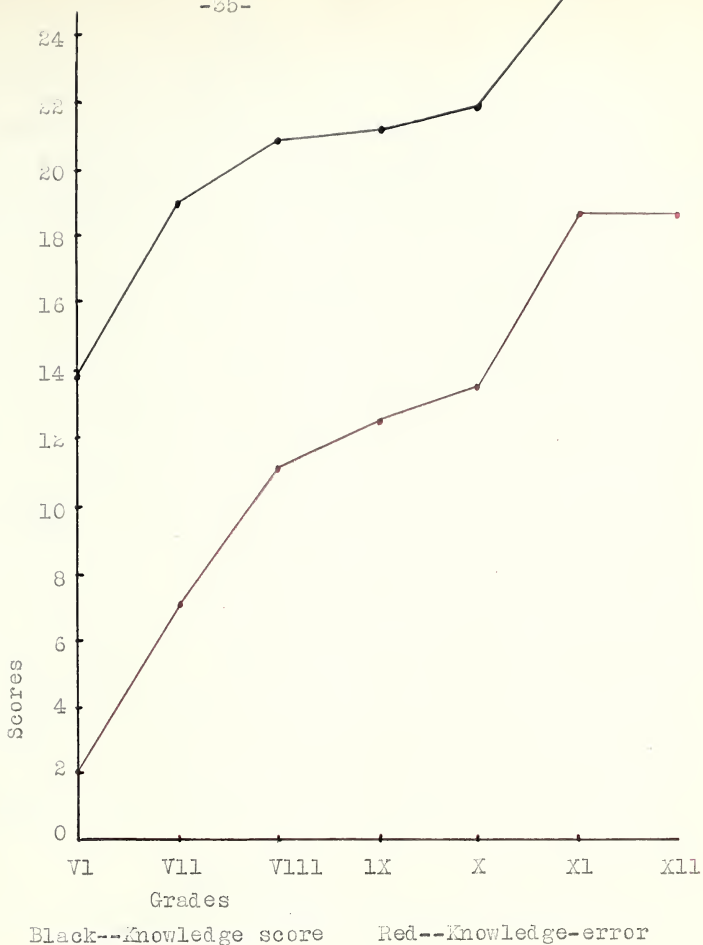


Figure 3b.- The probable limits within which the actual knowledge scores lie

THE ERROR SCORES

It has been an aim in this investigation to discover as comprehensively as possible what students know about certain words. Allowance has been made for the erroneous ideas connected with the words by scoring error separately. The error scores have been classified in the same three ways as the knowledge scores; they are shown in Tables IV, V, and VI, and the accompanying figures.

The error scores increase from grade to grade, except

grade VI to grade VII. The slight increase in error in this case may perhaps arise from the fact that the grade VII students attempted to answer many more questions than the grade VI students. In fact, they tried for more points than the students of grades VI, VIII, IX, or X. Thus it may be that both error and knowledge scores of grade VII are unduly augmented by guessing. The increase in error in the lower age intervals, both chronological and mental, may be similarly explained. It will be noted that, perhaps contrary to expectation, the error scores for the lower mental age groups are higher than those for the corresponding chronological age groups. Decrease in error with increasing mental age seems more rapid and steady than it does with increasing chronological age.

These error scores include the results of actual error and possibly of some guessing. The decrease in error scores observable in the higher groups probably shows a decrease in both actual error and guessing. It is not inherent in these tests to measure actual knowledge or error apart from the element of guessing.

TABLE IV
DECREASE OF ERROR BY GRADES

Grade	VI	VII	VIII	IX	X	XI	XII
No. of Students	32	36	22	26	12	16	22
E Scores (Hist.)	11.8	12.0	9.7	8.7	8.5	7.1	6.9
E Scores Science	9.9	10.3	9.6	6.6	6.2	4.8	4.8



TABLE V

DECREASE OF ERROR BY CHRONOLOGICAL AGE

Chronological Age Intervals Years & Months	No. of Students	Mean Error Score. Hist.	Mean Error Score Science.
11.0---11.5	4	9.9	8.8
11.6---11.11	4	10.0	8.9
12.0---12.5	9	12.7	10.5
12.6---12.11	19	11.2	9.5
13.0---13.5	10	11.0	9.7
13.6---13.11	15	11.1	9.2
14.0---14.5	13	11.3	9.6
14.6---14.11	16	11.0	9.1
15.0---15.5	13	9.8	7.9
15.6---15.11	14	8.9	6.6
16.0---16.5	12	7.3	5.3
16.6---16.11	5	7.1	5.4
17.0---17.5	8	7.4	5.7
17.6---17.11	11	7.5	5.6
18.0---18.5	3	8.4	5.7
18.6---18.11	4	7.2	5.0
19.0---19.5	--	---	---
19.6---19.11	3	6.6	4.9
20.0---20.5	1	6.2	3.3
20.6---20.11	1	7.2	5.3

TABLE VI

DECREASE IN ERROR BY MENTAL AGE GROUPS

Mental Age Intervals Years & Months	Number of Students	Mean Error Scores in History	Mean Error Scores in Science
10.0---10.5	3	13.5	11.8
10.6---10.11	2	16.3	12.6
11.0---11.5	5	13.6	12.4
11.6---11.11	4	12.9	11.4
12.0---12.5	10	11.7	10.3
12.6---12.11	13	11.7	9.5
13.0---13.5	13	10.6	8.7
13.6---13.11	8	11.5	9.5
14.0---14.5	12	10.7	9.4
14.6---14.11	10	8.7	7.0
15.0---15.5	16	9.0	6.9
15.6---15.11	8	9.2	7.5
16.0---16.5	20	8.7	6.5
16.6---16.11	11	6.5	5.2
17.0---17.5	8	6.6	4.6
17.6---17.11	4	6.6	3.7
18.0---18.5	1	6.7	6.0
18.6---18.11	1	5.0	4.3



Figure 4.- Decrease of error by grades

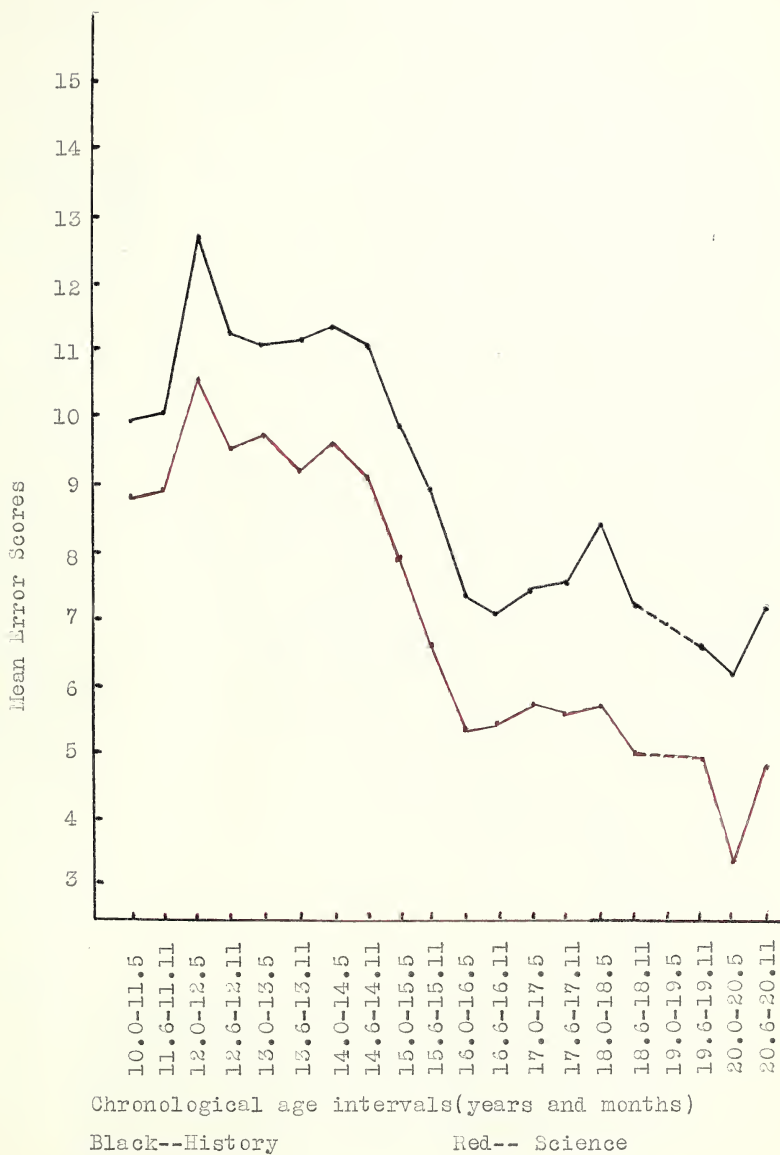


Figure 5.- Decrease of error by chronological age



Figure 6.- Decrease of error by mental age

THE KNOWLEDGE ERROR RATIO

In discussing the knowledge scores it was pointed out that, owing to the element of guessing, the increase in the knowledge score may not give an accurate picture of the actual knowledge increase. Suppose that a student has a knowledge score of 15 and an error score of 11, then, assuming that guessing will augment both scores equally, there are only 4 points of the 15 points which are certain to reflect actual knowledge. If a student of the next higher grade has a score of 20 for knowledge and 8 for error, there are 12 points certain for actual knowledge. Evidently the increase in actual knowledge could be as high as 300 percent, but considering only the recorded knowledge scores, the advance from 15 to 20 is only 33 1/3 per cent. If in each case the knowledge score is divided by the corresponding error score, the knowledge error ratio in the first case is 1.36 and in the second case is 2.5, an increase of over 80 per cent. It seems evident that the increase in this knowledge error ratio is a better approximation to the truth concerning the growth of actual knowledge than is the increase in the recorded knowledge scores. The data show that knowledge scores increase and that error scores decrease. From this it follows that the increase in K/E is a combined effect of these two tendencies. Also, decreasing error scores indicate decrease in guessing as well as decrease in actual error. Hence the tendency of the K/E ratio to increase points to a greater accuracy in word concepts.

The mean knowledge error ratios have been calculated for the different grades, and for the chronological and mental age groups. The results are shown in Tables VII, VIII, and IX and the accompanying graphs.

TABLE VII

RATIO OF MEAN KNOWLEDGE SCORES TO MEAN ERROR SCORES BY GRADES

GRADE	VI	VII	VIII	IX	X	XI	XII
No. of Students	32	36	22	26	12	16	22
Ratio K/E (Hist)	1.17	1.58	2.12	2.4	2.6	3.6	3.7
Ratio K/E Sc.	1.38	1.84	2.07	3.3	3.9	5.8	5.7

TABLE VIII

RATIO OF MEAN KNOWLEDGE SCORES TO MEAN
ERROR SCORES BY CHRONOLOGICAL AGE

Chronological Age Intervals. Years and Months	Number of Students	Ratio K/E History Words	Ratio K/E Science Words
11.0---11.5	4	2.1	2.1
11.6---11.11	4	1.5	1.8
12.0---12.5	9	1.4	1.7
12.6---12.11	19	1.6	1.9
13.0---13.5	10	1.7	2.0
13.6---13.11	15	1.7	2.1
14.0---14.5	13	1.9	2.3
14.6---14.11	16	1.9	2.3
15.0---15.5	13	2.2	3.0
15.6---15.11	14	2.7	4.2
16.0---16.5	12-	3.5	5.0
16.6---16.11	5	4.0	5.3
17.0---17.5	8	3.3	5.0
17.6---17.11	11	3.6	5.5
18.0---18.5	3	2.7	4.5
18.6---18.11	4	3.7	5.9
19.0---19.5	--	---	---
19.6---19.11	3	3.7	5.5
20.0---20.5	1	4.2	8.6
20.6---20.11	1	3.5	4.1

TABLE IX

RATIO OF MEAN KNOWLEDGE SCORES TO MEAN ERROR
Scores By Mental Age

Mental Age Intervals. Years & Months	No. of Students	Ratio of Knowledge Scores to Error Scores (Hist)	Ratio K/E Science.
10.0---10.5	3	1.0	1.1
10.6---10.11	2	0.9	1.3
11.0---11.5	5	1.1	1.3
11.6---11.11	4	1.4	1.6
12.0---12.5	10	1.3	1.5
12.6---12.11	13	1.3	1.7
13.0---13.5	13	1.7	2.1
13.6---13.11	8	1.7	2.1
14.0---14.5	12	1.9	2.2
14.6---14.11	10	2.4	3.2
15.0---15.5	16	2.4	3.4
15.6---15.11	8	2.6	3.4
16.0---16.5	20	2.9	4.4
16.6---16.11	11	3.8	5.1
17.0---17.5	8	4.2	6.3
17.6---17.11	4	4.4	8.5
18.0---18.5	1	4.2	4.9
18.6---18.11	1	5.8	6.7

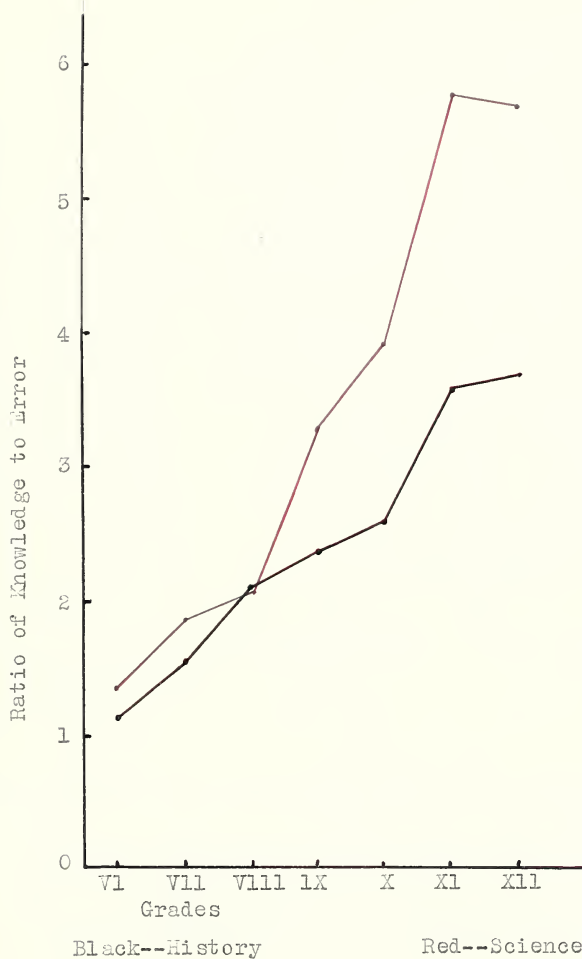


Figure 7.- Ratio of mean knowledge scores to mean error scores by grades

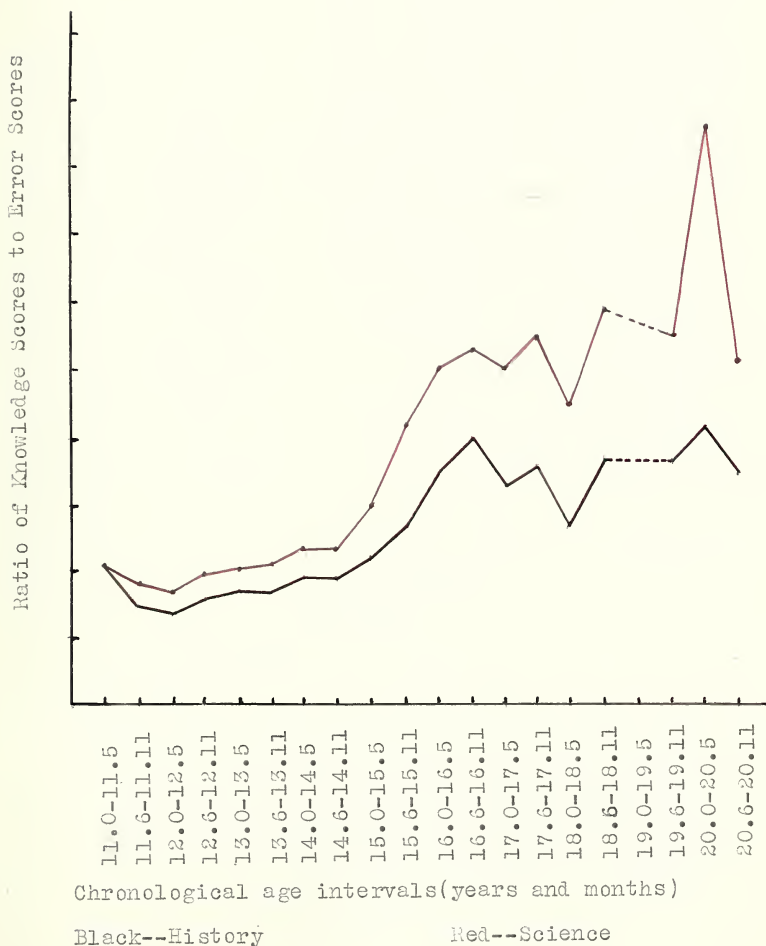


Figure 8.- Ratio of mean knowledge scores to mean error scores by chronological age

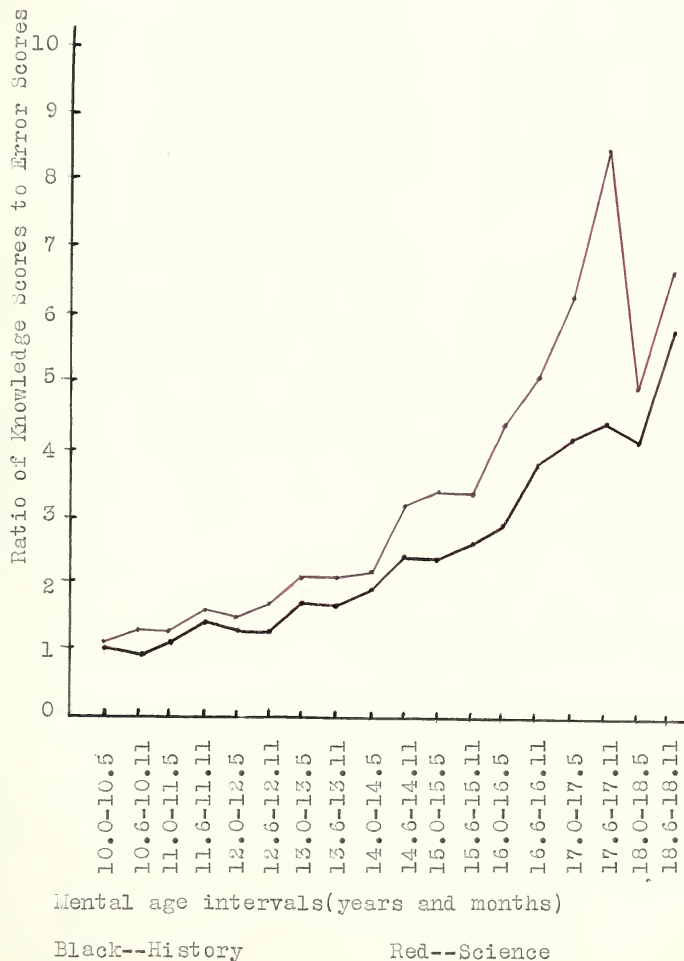


Figure 9.- Ratio of mean knowledge scores to mean error scores by mental age

From grade VI to grade VIII the increase in the K/E ratio is gradual; from grade VIII to grade X the increase advances less rapidly. The greatest increase is from grade X to grade XI; there is only a very slight increase from grade XI to grade XII, it being due to a reduction in both knowledge and error scores by a small and equal amount. From chronological age 12 ~~xxx~~ to 15 there is a slow, steady gain; from 15 to 17 there is a rapid increase; from that point there is an irregular decline. The increases from group to group are more steady and rapid with increasing mental age than with increasing chronological age. Increasing accuracy of knowledge, as measured by the K/E ratio, seems most closely related to mental age, secondly to grades, and least of all to chronological age.

A considerable degree of reliability of the preceding results is indicated by the general agreement in the results obtained by Mr. McLean and by myself. It is observable that, in general, for the same groups, the scores rise and fall together, and in very many instances at approximately the same rate or by the same amount. Since the same students have shown such uniformity in scores on these sets of tests, it would seem that these tests are measuring the same qualities and are doing so fairly reliably. The fact that the two tests dealt with different types of words, were not identical in structure, and were scored by different persons increases the significance of the correspondence in the results.

A comparison of the results obtained by us on these tests is interesting. The mean knowledge scores for the History and the Science words agree closely, both by mental and by chronological age up to about 15 years 6 months, after which the scores on the Science words advance more rapidly and are continuously above the scores for the History words. By grades, the two scores are nearly the same until grade IX, after which students consistently show greater knowledge of the Science words. In all cases, the error scores are greater for the History words than for the Science words, and the K/E ratios are lower for History words than for Science words. This would

suggest that in teaching of History less emphasis has been placed on the meaning of the concepts involved than in the teaching of Science.

CHAPTER V

A MORE DETAILED QUALITATIVE ANALYSIS

CORRECT USAGE OF WORDS

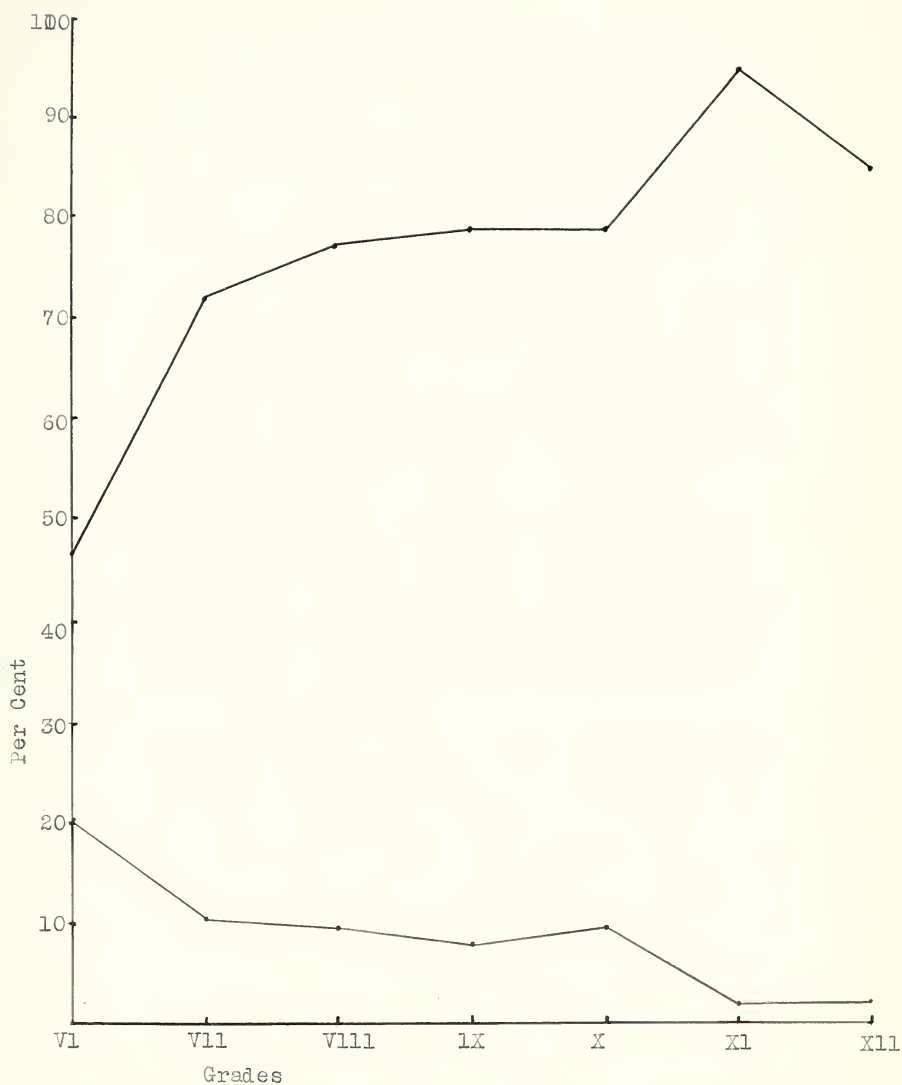
The second question on every test asked the student to use the test word in an original sentence in such a way as to show an understanding of the meaning, or one of the meanings, of the word. Table X and the accompanying graph show the mean per cent of students in each grade of the students who used the words correctly and incorrectly, regardless of whether their answer was scored as 1, 2, or 3.

The Table shows that, as regards the ability to use words correctly in sentences, there is a rapid increase from grade VI to grade VII, a slow increase from there to grade X, another rapid increase to grade XI, and a decrease in grade XII.

TABLE X

PERCENT OF STUDENTS USING WORDS CORRECTLY OR INCORRECTLY IN ORIGINAL SENTENCES.

Grade	VI	VII	VIII	IX	X	XI	XII
% Correct	46.4	71.8	77.4	78.9	78.7	95.4	85.5
% Incorrect	20.6	10.6	9.8	8.0	9.9	2.0	2.6



Black--Per cent of students who used the words correctly

Red--Per cent of students who used the words incorrectly

Figure 10.--Per cent of students using the words correctly or incorrectly in original sentences

DEFINITIONS

The third question on every test called for as complete a definition of the test word as the student could give. All the items in all the definitions were rated as being right or wrong, and all those classed as right or correct were further rated as being, good, fair, or poor. These responses have been analyzed in two ways. Firstly, of all the items in the definitions, the per cent right and the per cent wrong, and the percent of those right which have been rated as good, fair, and poor, have been calculated. This analysis does not consider the number or the percent of students who defined the words, nor does it indicate the number who did not attempt to define the words. Table XIa and Figure 11a show the results of this analysis.

Secondly, the mean number of items in each class of definition was calculated for all the students in each grade. This analysis compares all the students of all the grades, not only those who attempted to define. Table XIb and Figure 11b show the results of this analysis.

The ability to define words correctly, as indicated in these tables, increases steadily to grade XI. The ability to give a good definition increases in close agreement with the ability to define rightly; it increases up to grade XII. However, even in grade XII, under fifty per cent of all the items in the definitions are rated as good. From grade to grade, there is not much variation in the number of definitions rated as fair or poor. Both analyses show a very rapid increase in ability to define correctly from grade VI to grade VIII. Table XIb shows a more continuous increase from grade VI to grade XI than Table XIa shows, and because it considers all the students in the grades, it is likely to be the more reliable of the two in indicating increasing merit. Grade VIII compares very favourably with grade XI as regards the percentage of all definitions rated as right, whereas it compares far less favorably as regards the mean number of definitions rated as right.

TABLE XIa

CLASSIFICATION OF DEFINITIONS

GRADE	% of items right.	% of items Good.	% of items Fair.	% of items Poor.
VI	37.1	8.5	8.8	19.8
VII	56.4	15.3	21.6	19.6
VIII	73.2	26.8	28.0	18.5
IX	70.8	27.4	22.6	20.8
X	74.5	33.1	21.2	19.6
XI	81.1	43.9	26.4	10.8
XII	81.4	48.1	22.4	9.9

TABLE XIb

CLASSIFICATION OF DEFINITIONS

Grade	Mean No. Right	Mean No. Right Good	Mean No. Right Fair	Mean No. Right Poor	Mean No. XXXXXX Wrong.
VI	.30	.07	.07	.16	.50
VII	.51	.14	.20	.18	.39
VIII	.75	.29	.26	.19	.29
IX	.76	.30	.24	.22	.31
X	1.00	.43	.30	.27	.36
XI	1.13	.53	.37	.15	.26
XII	1.04	.60	.29	.13	.28

It should be noted that in defining the words the students were obliged to create their own answers. To give good definitions requires considerable power of abstract thinking. For this reason, the scores made on this question are perhaps the best indication of increase in merit of abstract thinking. Growth of denotation seems to be best indicated by the increase in the percentage of correct definitions and in the mean number of definitions scored as right. Growth in the power of abstract thinking is perhaps more closely linked with the increase in the percentage of right definitions and the mean number of right definitions which were also rated as good. No doubt all the questions in the tests have also measured to some extent the qualities of denotation and abstraction, yet in my opinion, this question measures these qualities more specifically.

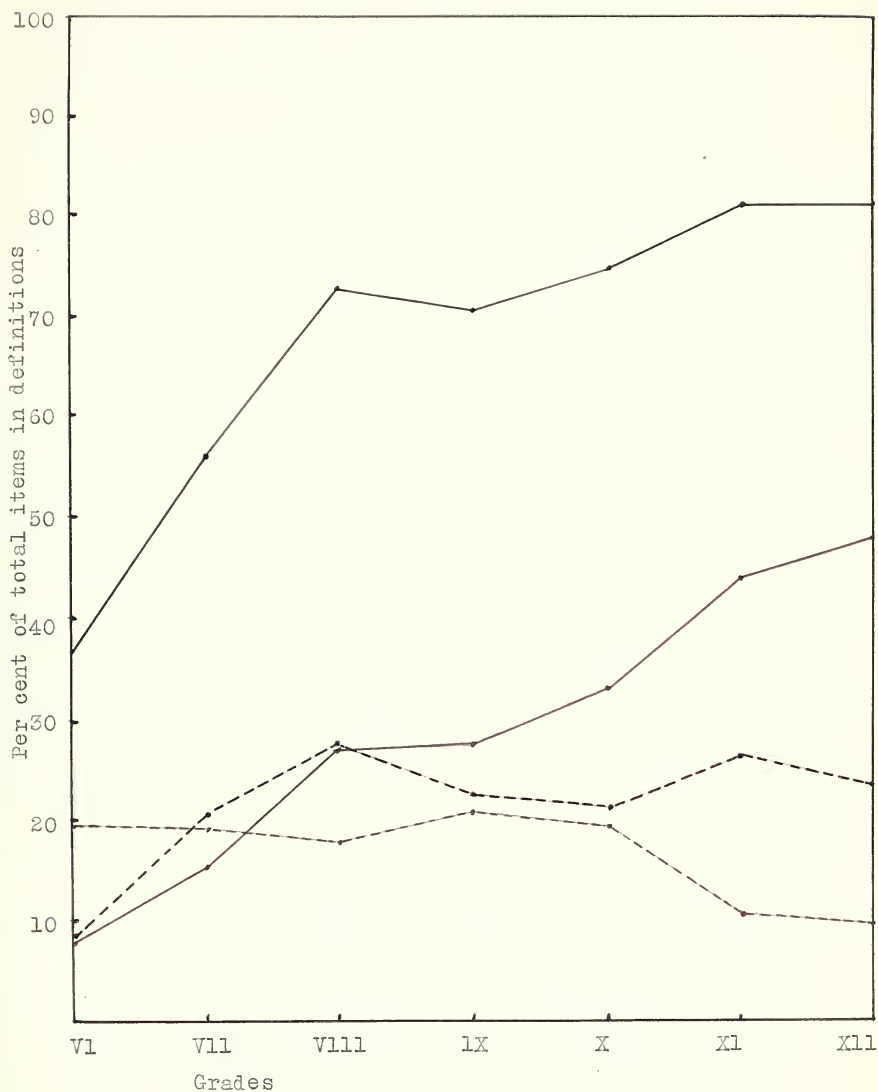
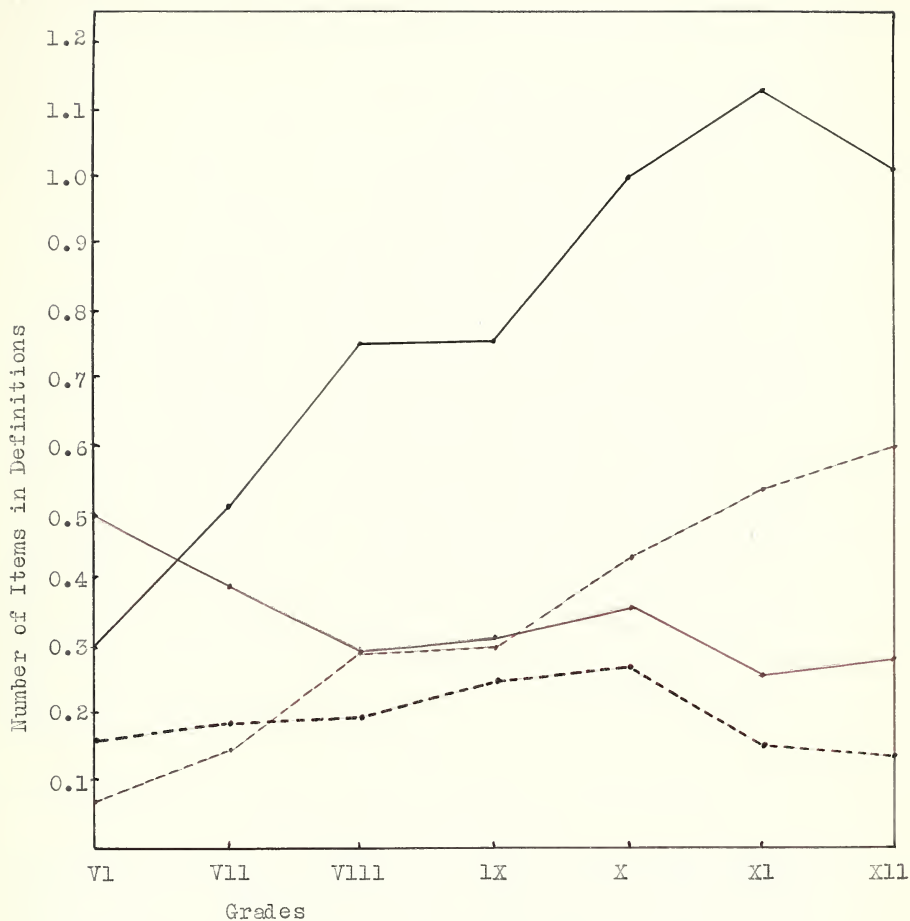


Figure 11a.- Mean per cents of all items in definitions scored as right, right good, right fair and right poor



Solid black line--mean number of items right
 Solid red line--mean number of items wrong
 Broken black line--mean number of items right and poor
 Broken red line--mean number of items right and good

Figure 11b.-Mean number of items per student per definition, scored as right, right good, right poor and wrong

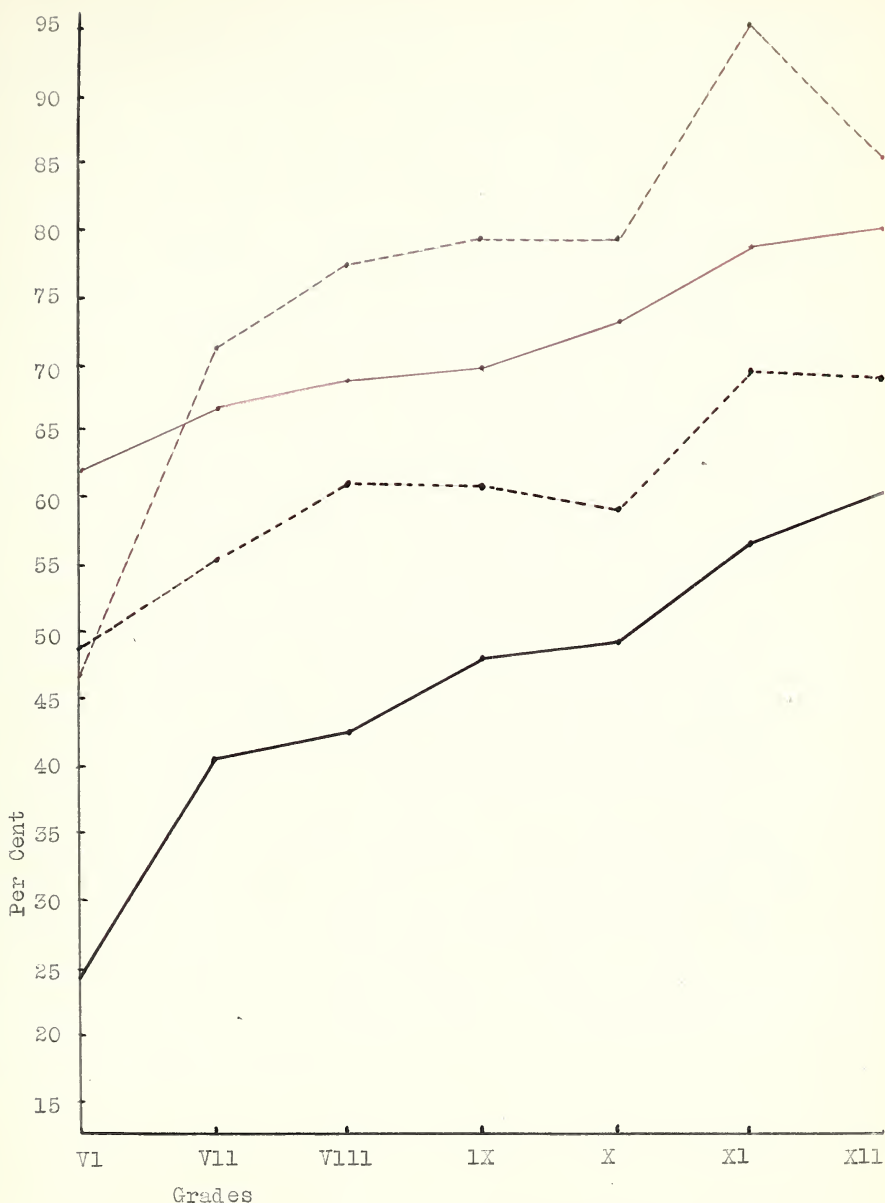
RECOGNITION OF CORRECT USAGE, CORRECT SELECTION OF SYNONYMS, AND EXTENSION OF KNOWLEDGE.

In each of the tests a question was included in which the test word was used in a number of sentences, in some cases correctly, in some cases incorrectly. The students were asked to indicate each usage as being correct or incorrect. The mean per cent scores recorded below were obtained by taking the mean of the mean per cent scores made by each grade on all the tests which included this question. Another question asked the students to select from a list of words, some of which were synonyms, some of which were not, the word nearest in meaning to the test word. The final mean per cent score was obtained in the manner explained above. In order to obtain some measure of connotation, one or more questions were selected from each test which seemed to me to measure this quality better than the other questions did. These questions may also be considered to measure extension of knowledge of the words. A separate score was obtained for the results of these questions. Table XII and the accompanying graph show the results.

TABLE XII

RECOGNITION OF CORRECT USAGE, SELECTION OF SYNONYMS, AND EXTENSION OF KNOWLEDGE.

GRADE	VI	VII	VIII	IX	X	XI	XII
Recognition	62.0	66.8	68.4	69.9	73.1	76.4	80.1
Synonyms	24.0	40.8	42.4	47.9	49.0	55.9	60.1
Extension	46.4	55.2	61.0	60.9	66.9	69.3	68.9



Solid black line--mean per cent of possible synonyms correct
 Solid red line--mean per cent of usages recognized correctly
 Broken black line--mean per cent of possible items correct
 Broken red line--per cent of students using word correctly

Figure 12.- Comparison of ability to use words, to recognize correct use, to select synonyms, and to answer questions involving extension of knowledge

A few points should be noted in interpreting these results. The questions testing recognition of correct usage and extension of knowledge, or connotation, were such as permitted only two answers, hence guessing could more easily affect those results than the others. Also, the questions chosen relating to extension of knowledge were generally those which even the students of the lower grades attempted to answer, that is, I excluded from this analysis any questions which students generally failed to attempt to answer.

The Tables and graphs would seem to show that grade VI students have greater ability to recognize correct usage than they have to write original sentences containing the words correctly used. From grades VII to XII, the ability to use words correctly is superior to their ability to recognize correct usage. In general, it seems that the ability to use words, the ability to recognize correct usage, the knowledge of additional meanings and application of words, and the ability to select synonyms are developed in the order listed. An explanation of this may be that students gain much of their extension of knowledge of words and learn of the difference between and similarities of words from using them and from seeing them and hearing them used. The selection of synonyms is most difficult for all grades. It appears that, on the whole, increasing mastery in these four abilities advance in parallel manner.

CHAPTER VI

ESTIMATION OF MATURITY

One of the aims in this investigation was to determine growth in maturity. To do this, some standard of maturity was required as a basis for comparison. A set of tests on the word "state" was sent to Dr. M.E. Lazerte, University of Alberta. He gave these tests to a senior University class of forty students. The tests were returned and scored by myself on the same basis as for the younger students. The test on the word "state" was one of average difficulty for the students. The majority of the grades made almost exactly or only slightly less than their mean score on this test. The following tables and graphs show the scores made on this test by the grades and by the University class. All the items in the definitions of this word are also given here as I scored and rated them. This will indicate whatever degree of accuracy there may be in the ratings of the definitions previously discussed.

It is not assumed that the results of one test are reliable. Yet a comparison of Figures 1, 4, and 14 will show that the mean knowledge and error scores for the word "state" are closely approximate to those for all the words. Probably, therefore, comparisons between the University students and the school students are reasonably comparable as regards knowledge and error. In both cases, the University scores are considerably better than the best scores made by the High School students. Figures 13a and 13b will show this. A comparison with figures 11a and 11b indicate that the definitions for the word "state" are not typical of school students' definitions in general. Yet both the Tables, graphs, and the analysis of the items in the definitions will show that University students possess a much greater wealth of knowledge of the word, a greater power of elaboration of ideas, and a greater ability to think abstractly.

Figure 16 shows that the University students are better able to use the word correctly in sentences, to recognize correct usage, and to select synonyms than the High school students are. Of these abilities, they show a greater superiority in the selection of synonyms.

No comparison is made in respect to extension of knowledge for the questions selected for this purpose were misunderstood by a few of the University students.

In Table 15, the knowledge score made by the University class, though not a perfect score, has been considered to be a maturity score, and on that basis is considered to be 100 per cent. The knowledge scores made by the grades on the same test have been calculated as per cents of the University score. In the same Table, the K/E ratio achieved by the University students has also been considered as a maturity ratio, and the ratios achieved by the other grades on the same test have been calculated as per cents of it. This second comparison shows a greater difference between grade XII and the University class than the former comparison shows. However, the fact that grade X has a higher K/E ratio than grades XI or XII, in this case at least, suggests that the difference in the ratio is probably not a very reliable indication of the difference in maturity.

TABLE XIIIa

CLASSIFICATION OF DEFINITIONS OF "STATE".

GRADE	% GOOD	% FAIR	% POOR	% RIGHT	% WRONG
VI	7.9	23.7	13.2	44.6	55.3
VII	1.9	36.5	7.6	46.0	53.8
VIII	23.0	27.0	3.0	53.0	47.0
IX	20.0	32.5	5.0	57.5	42.5
X	10.0	30.0	15.0	55.0	45.0
XI	27.0	24.4	4.9	56.3	43.7
XII	30.8	11.5	5.8	48.1	51.9
Univ.	51.0	17.0	13.0	81.0	19.0

TABLE XIIIb

CLASSIFICATION OF DEFINITIONS OF "STATE".

GRADE	VI	VII	VIII	IX	X	XI	XII	Univ.
No. of Students	28	33	20	22	9	12	17	40
% Def. Correct*	57.2	51.5	55.0	72.7	77.8	91.7	88.2	90.0
Mean No. R. Items	0.64	0.73	0.80	1.05	1.22	1.92	1.71	2.45
Mean No. W. Items	0.75	0.85	0.70	0.77	1.00	1.50	1.59	0.57
Mean No. G. Items	0.11	0.03	0.35	0.36	0.22	0.92	0.94	1.55
Mean No. F. Items	0.32	0.58	0.40	0.59	0.67	0.83	0.35	0.50
Mean No. P. Items	0.18	0.12	0.05	0.09	0.33	0.17	0.18	0.40

* This refers to the percent of students in each grade who defined the word correctly.

R--right; W--wrong; G--Good; F--Fair; P--Poor.

TABLE XIV

MEAN KNOWLEDGE AND ERROR SCORES BY GRADES FOR WORD "STATE".

GRADE	VI	VII	VIII	IX	X	XI	XII	Univ.
NO. Students	28	33	20	22	9	12	17	40
K. Score	13.5	18.7	19.5	18.2	21.8	22.7	22.7	27.8
E. Score	13.1	13.6	11.5	10.0	8.5	10.2	9.2	6.8
Ratio K/E.	1.0	1.4	1.7	1.6	2.5	2.2	2.4	4.1

TABLE XV

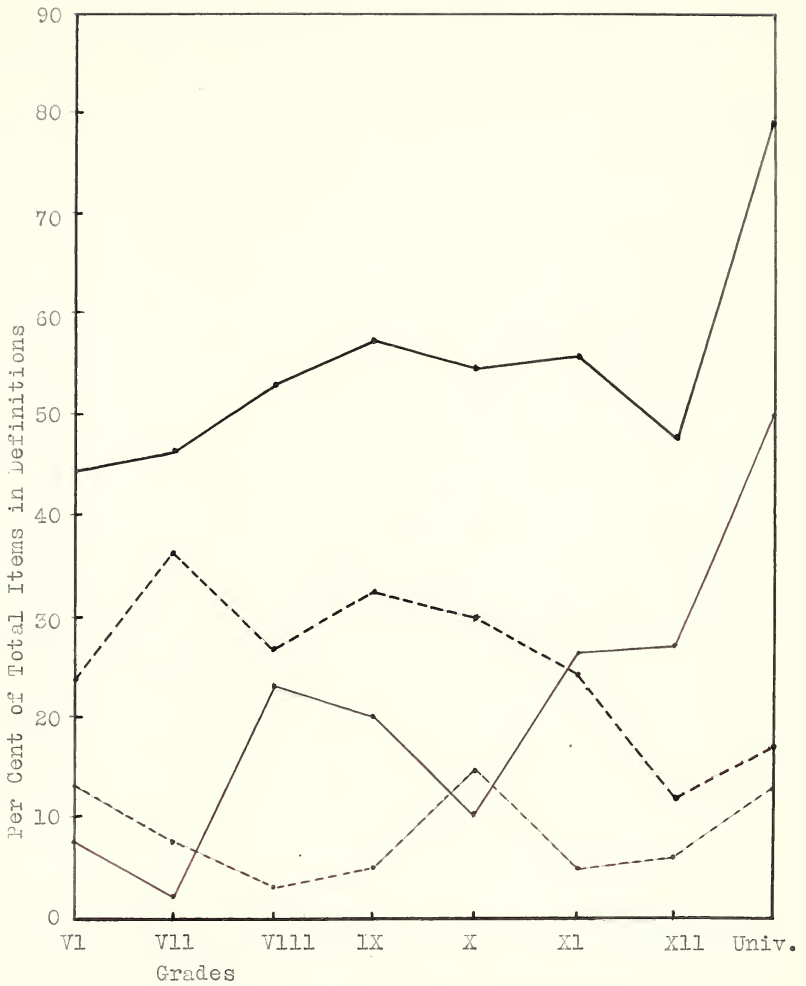
PERCENT OF UNIVERSITY SCORE ACHIEVED BY GRADES (STATE).

GRADE	VI	VII	VIII	IX	X	XI	XII	Univ.
% of K.	48.5	67.2	70.1	65.8	78.4	81.6	81.6	100
% of K/E	24.4	31.7	41.5	39.0	61.2	53.6	68.5	100

TABLE XVI

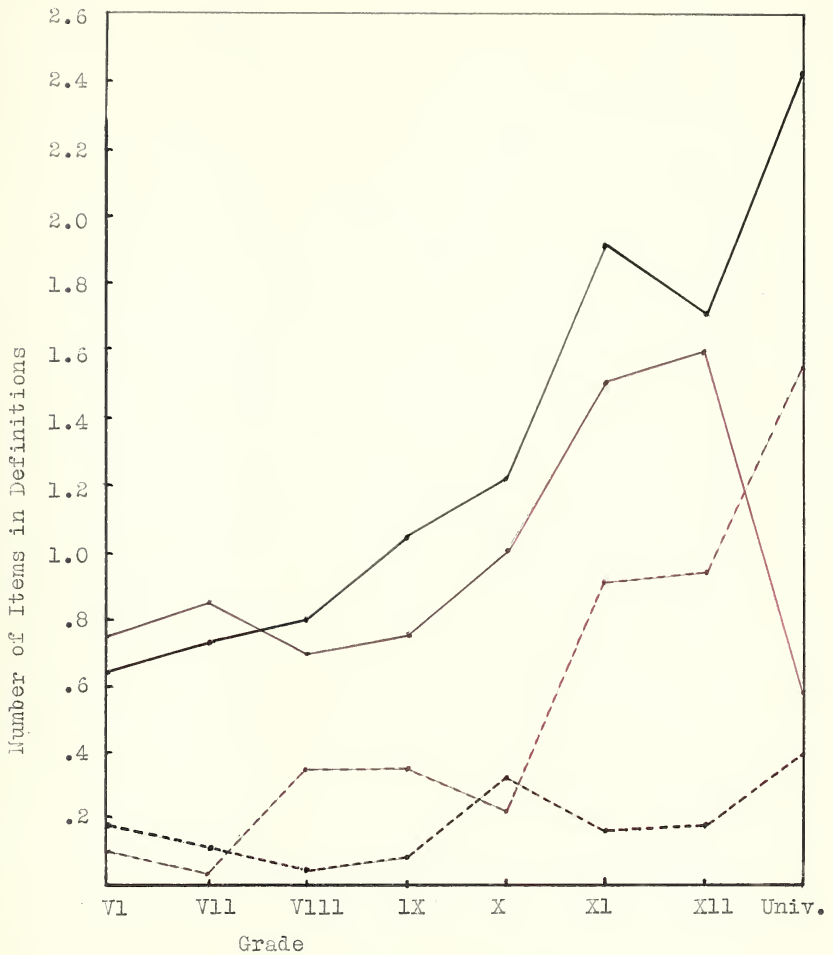
PERCENTAGE BY GRADES OF STUDENTS USING WORD CORRECTLY, RECOGNIZING CORRECT USE, AND SELECTING SYNONYMS.

GRADE	VI	VII	VIII	IX	X	XI	XII	Univ.
% Correct Use	75.0	84.8	85.0	86.4	77.8	91.7	88.2	95.0
% Correct Recognit.	67	74	72	80	85.2	82	80	91.7
% Correct Synonyms	18.1	31.5	27.0	25.9	36.7	35.8	41.2	54.5



Solid black line--per cent of items right
 Solid red line--per cent of items right and good
 Broken black line--per cent of items right and fair
 Broken red line--per cent of items right and poor

Figure 13a.- Mean per cents of all items in definition of word "state" scored as right, right good, right fair and right poor



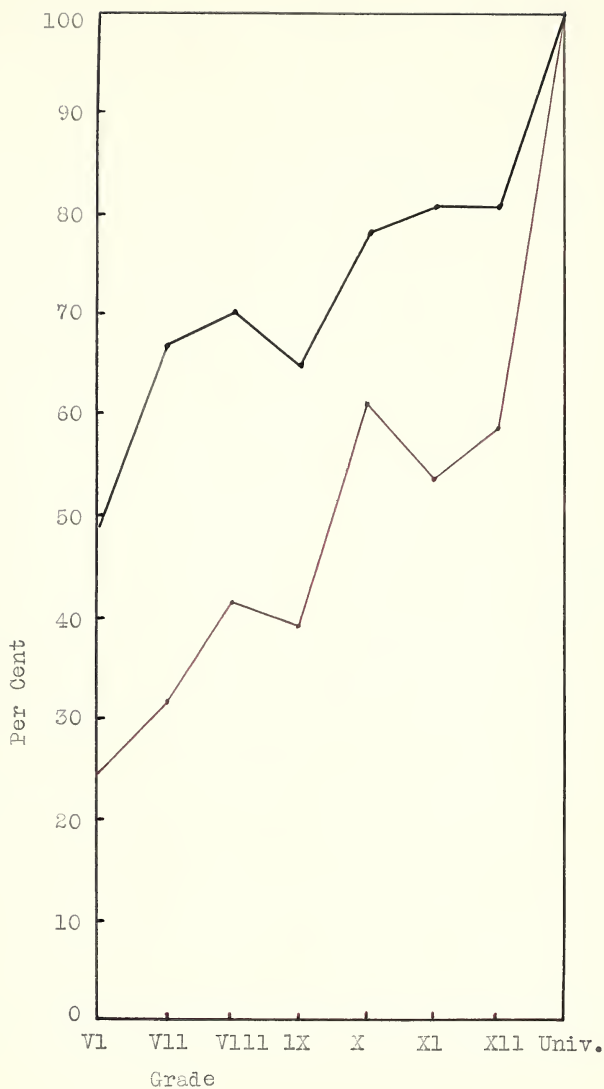
Solid black line-- mean number of items right
 Solid red line--mean number of items wrong
 Broken black line--mean number of items right poor
 Broken red line--mean number of items right good

Figure 13b.- Mean number of items per student per definition of word "state" scored as right, right good, right poor and wrong



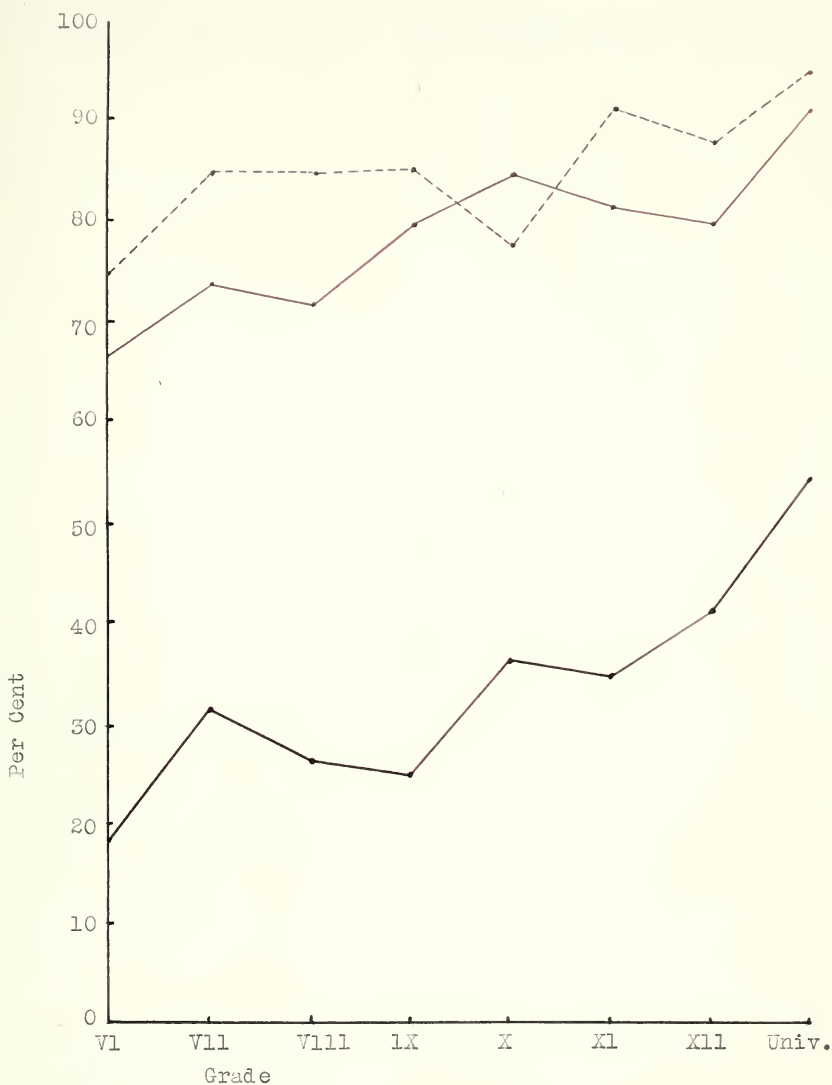
Black line--knowledge score
Red line--error score

Figure 14.- Mean knowledge and error scores by grades for the word "state".



Black line--Knowledge scores of the grades as per cents of the university knowledge score
 Red line--Knowledge error ratio of the grades as per cents of the university knowledge error ratio

Figure 15.- Per cents of university knowledge score and knowledge error ratio achieved by grades for the word "state"



Solid black line--mean per cent of possible synonyms correct
 Solid red line-- mean per cent of usages recognized correctly
 Broken red line--per cent of students using word correctly

Figure 16.-- Per cents by grades of students using the word "state" correctly, recognizing correct usage, and selecting synonyms

DISTRIBUTION OF ITEMS BY GRADES IN DEFINITIONS OF WORD "STATE".

Grade	VI	VII	VIII	IX	X	XI	XII	Un.	R
Total Number of students	28	33	19	22	8	13	17	40	
to tell or say etc.	6	10	2	9	3	8	3	8	F
a country without a king (ruler)	5	1	-	-	-	-	-	-	P
a condition	3	2	7	8	2	8	11	22	G
a country	2	5	1	-	1	1	1	3	F
a country way	1	-	-	-	-	-	-	-	W
a province (like)	1	2	3	2	-	3	2	4	F
a country with a king	1	-	-	-	-	-	-	-	P
a region	1	-	1	-	-	-	2	1	W
a piece of land	1	-	-	2	-	-	-	-	W
land	1	-	-	-	-	-	-	-	W
a part of a country	1	4	1	6	2	1	1	2	W
to put	2	-	-	-	-	-	-	-	W
to put down	1	-	-	1	-	-	-	-	W
to explain	1	-	-	-	-	-	-	-	W
ask	1	-	-	-	-	-	-	-	W
to explain	1	-	-	-	-	-	-	-	W
Time given	1	-	-	-	-	-	-	-	W
order	1	-	-	-	-	-	-	-	W
Majestic	1	-	-	-	-	-	-	-	W
grand	1	-	-	-	-	-	-	-	W
showy	1	-	-	-	-	-	-	-	W
heroic	1	-	-	-	-	-	-	-	W
evidence	1	-	-	-	-	-	-	-	W
judge	1	-	-	-	-	-	-	-	W
to surround	1	-	-	-	-	-	-	-	W
health	1	-	-	-	-	-	-	-	W
health of land	1	-	-	-	-	-	-	-	W
a place		2	-	1	-	-	-	-	W
part of land		2	-	-	-	-	-	-	W
country divided into parts		2	-	-	-	-	-	-	P
a bad condition		2	-	-	-	-	-	-	W
a town		2	-	-	-	-	-	-	W
a district in a country		1	-	-	-	-	-	-	W
a place governed by a governor		1	-	-	-	-	-	-	P
a place ruled by a president		1	-	-	-	-	-	-	P
to define		1	-	-	-	-	-	-	W
to be very important		1	-	-	-	-	-	-	W
belonging to a country		1	-	-	-	-	-	-	W
to order something		1	-	-	-	-	-	-	W
getting into trouble		1	-	-	-	-	-	-	W
area of land		1	-	-	-	-	1	-	W
to select		1	-	-	-	-	-	-	W
to answer		1	-	1	-	-	-	-	W
way a country is divided		1	-	-	-	-	-	-	W
to write something on paper		1	-	-	-	-	-	-	W
situation(syn. for condition)		1	1	-	-	-	-	-	P
what anything says or has written in it		1	-	-	-	-	-	-	W
governor		1	-	-	-	-	-	-	W
what you say		1	-	-	-	-	-	-	W
to point out			2	-	-	-	-	-	W
a part			2	-	-	-	-	-	W
a division			2	-	-	1	-	-	W
a place belonging to a country or person			1	-	-	-	-	-	W
position			1	1	-	-	1	-	W
how and what			1	-	-	-	-	-	W
something that concerns a person or thing			1	-	-	-	-	-	W
character			1	-	-	-	-	-	W
to write down			1	-	-	-	-	-	P
manner of living			1	-	-	-	-	-	F
way anything is			1	-	-	-	-	-	F

Distribution of Items by Grades in Definitions of Word "State."

GRADE	IX	X	XI	XII	Un.	R
Total number of students.	22	8	13	17	40	
to name something	1	-	-	-	-	W
name of state in U.S.A.	1	-	-	-	-	P
piece of land governed by people	1	-	-	-	-	P
laws	1	-	-	-	-	W
grandeur	1	-	-	-	-	F
majesty	1	-	-	-	-	F
a piece of land sectioned off	1	-	-	-	-	W
to talk	1	-	-	-	-	W
give	1	-	-	-	-	W
a specified area of land having a name of						
its own	2	-	-	-	-	P
magnificent	1	-	-	-	-	W
grand	1	-	-	-	-	W
the matter of	1	1	-	-	-	W
way of (a thing)	1	-	-	-	-	W
the manner of	1	-	-	1	-	W
a specified area of land with its own						
constitution (or government)			3	6	-	G
a specified area of land			1	-	-	W
an area of land having specified boundaries			1	-	-	W
a stress a fact			1	-	-	W
a fact			1	-	-	W
to express			1	-	-	F
an independent area of land			1	-	-	G
to mention			1	-	-	W
honorable			1	-	-	W
a certain thing			1	-	-	W
appearance			1	-	-	W
a division of land			1	-	-	W
honored			1	-	-	W
graceful manner			1	-	-	W
a statement			1	-	-	W
stature				1	-	W
locality				1	-	W
dignified				1	-	W
stately				1	-	W
grand				1	-	W
outlining one's case				1	1	P
a political division				1	-	W
to set down				1	-	F
make known				1	-	F
to write facts about				1	-	W
affair				1	-	W
exact				1	-	F
an area of land divided into states				1	-	W
way a country is divided for government				1	-	W
to list down				1	-	W
prominence				1	-	G
rank				1	-	W
confirmed				1	-	W
listed				1	-	W
appointed				1	-	G
status				1	5	G
government					2	P
condition of being					3	G
mental condition					2	F
like a state in U.S.A.					1	P
group of people living together in a given area of land					3	P
aforementioned and agreed upon					1	G
independent self-governing community					1	G
condition of importance or luxury					1	G
to express in orderly manner					2	P
some fixed order or arrangement						

DISTRIBUTION OF ITEMS BY GRADES IN DEFINITIONS OF WORD "STATE."

Grade	Un.	R.
Total number of students	40	
A territory in which all people are under one govt.	1	G
a political axis unit of a type	1	P
enumerate	2	G
a complex organization having the care of its own affairs		
a ruled by its own members	2	W
to tell definitely with a view to give evidence	1	P
condition of health, cleanliness, etc.	1	G
relate	3	G
a political body representing the people	1	P
to tell something you are quite definite about	1	G
fixed (adjective)	1	P
a political division of a country	1	P
to say definitely (specifically)	3	G
the system of government in any country	1	W
a district for governmental purposes	1	W
pomp or dignity	3	G
a fixed condition	1	G
conservatism	1	W
high rank	1	W
a fixed geographical area	1	W
a realm with its own government	1	G
of the government	1	G
condition existing at a particular time	1	G
form of government	1	W
explicit announcement of place or time	1	W
enumeration of events.	1	W
condition of an object	1	G
to recall and give events	1	F
regal proceedings	1	G
to make a statement	1	P
a political division such as a country or part of a country	1	F
locality	1	W
a body of people having their own government	1	F
a part of a realm or kingdom	1	W
to describe	1	W
a governmental unit or section of a country	2	P
a portion of a country having a government of its own	1	G
standing or state of something	1	W
property	1	W
a political entity	2	G
lay down	1	W
regal dignity	1	G
stately and dignified	1	W
condition of feeling	1	G
an autonomous country	1	G
a democratic gov country	1	W
to declare	1	P
an impression of something relating to government or		
royalty	1	W
act of speaking	1	W
manner	1	W
condition of affairs	1	G.
R---rating		
W---wrong		
G---good		
F---fair		
P---Poor		

CHAPTER VII

CRITICISMS, INTERPRETATIONS AND CONCLUSIONS.

CRITICISMS

1. The tests, in being written, were subject to certain limitations. The students' responses did not sufficiently indicate the breadth and depth of knowledge possessed. It was difficult to eliminate the effects of guessing. The tests were partly testing the ability to read and to give written answers.
2. Although it is difficult to measure separately such qualities denotation, connotation, and power of abstraction, yet it is perhaps possible to extract from the tests certain approximate measures of these qualities.
3. Certain questions, such as asking the student to give other forms of the word, were found to be of little value, at least in the manner in which they were given.
4. Some of the questions were not sufficiently apt in that they did not bring out the knowledge or information wanted.
5. In spite of careful forethought some unexpected responses were given which were difficult to score.
6. We sought to avoid bias by collaborating in the construction of the tests and in considering possible responses.
7. The sampling varied as between groups and probably was too small.
8. There is a possibility that the different meanings, uses, applications of the words, and similar matters did not receive emphasis proportionate to their importance.
9. The tests were uniform for all students.
10. The tests were sufficiently easy to bring out any knowledge possessed and sufficiently difficult and comprehensive to call forth the fullest knowledge of the most mature students.

11. Evidence that the tests were sufficiently comprehensive is suggested by the fact that students seldom gave any information beyond that specifically called for, either in the last question of the earlier tests, or when questioned orally after writing the tests.
12. We feel that the remarkable correspondence in the results of the two investigations, as previously noted, is evidence that these tests, though varying in structure, do possess considerable reliability.

INTERPRETATION OF RESULTS

Certain local conditions, such as the small number of students tested, the predominance of foreign language influence, especially in the lower grades, and the possible effects of local teaching, may have given a bias to the results of these tests. Although each set of tests has tested directly only twelve words, yet indirectly they have tested a considerable range of vocabulary. These tests were not completely objective, for the subjective element may have influenced both the setting of the questions and the scoring of the responses, especially of the definitions.

GENERAL CONCLUSIONS.

1. Knowledge of the words tested increases by grades, mental age and chronological age. Judging from the results, increasing knowledge advances most in accord with mental age, next with grades, and least of all with chronological age.
2. Error decreases in the same order that knowledge increases.
3. A comparison of the results of the two investigations suggests that there is less error associated with the Science words than with the History words, even though the lower groups begin with approximately the same amount of knowledge.
4. It is likely that the increase of knowledge and the decrease of error are more pronounced at certain levels.
5. Knowledge of words is more extensive and more accurate in the later years of adolescence.

6. In general, the ability to use words is in advance of the ability to recognize correct usage, to define words, and to select synonyms.
7. The erroneous concepts associated with words are numerous and they have a tendency to persist in even the higher levels.
8. The teaching of History especially and of Science to a lesser degree have apparently failed to clarify sufficiently for the students the meanings of the words employed in the respective subjects.
9. The results suggest the possibility of constructing a normal curve of growth of knowledge of words for school students.



